The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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Brown's Rock Crusher.

Rock crushers cover one very important field in the reduction of large masses to small sizes, which rolls and stamp-mills cannot occupy satisfactorily. The demands made upon crushing machinery are continually growing more exacting and more numerous. In the various departments of industry the question is more frequently coming up how to reduce material to a size ranging between a given maximum and minimum. In ore dressing, ballasting railroad tracks, macadamizing roads, the manufacture of cement, fire-brick, glass, porcelain, &c., hard substances of large dimensions must be broken to approximately uniform middle sizes. Hitherto the Blake crusher and its imitations have stood alone, until recently a new principle has been applied simultaneously, it would seem, both in this country and in Europe. We refer to those apparatus which on a large scale imitate the action of the old coffee grinding mill. The Brown crusher, of which we give two sections fully showing its main points, consists of an upright circular shell A, lined with chilled iron, specially adapted to resist the great wear. An upright shaft B B is pivoted by a ball and socket joint in its upper part, the other end being placed in the hub of a bevel gear in an eccentric position with reference to the center of the hub. The upper part of this shaft is tapered and is provided with a collar C, the second crushing surface, the section Fig. 2 showing clearly the means by which slipping of the collar is prevented. As the bevel gear wheel G revolves the breaking head receives an eccentric gyratory motion, and it advances successively toward every portion of the face L, crushing the ore. The arrangement for compensating for wear, it will be seen, consists of a lever, acting upon a plate, upon which the shaft B is stepped. An inclined plane, provided with a large collar surrounding the vertical shaft, for preventing any material from falling upon the gearing, carries the fine material out of the opening H. A fly-wheel regulates the motion of the machine. It is claimed that the crusher, when compared to those rock breakers having a reciprocating motion, has the advantages attendant upon continuous motion, and that the strains to which the machine is liable are by far smaller, and therefore admit of lighter construction. The action is less grinding or rubbing, but chiefly crushing, which reduces the percentage of fine sand made. Two sizes are made by the manufacturers, the Gates & Scoville Iron Works, of Chicago, No. 1 weighing 7500 lbs. and No. 2 weighing 20,000 lbs. The former is intended for mines and mills, the latter chiefly for ballasting and macadamizing.

FIG2.

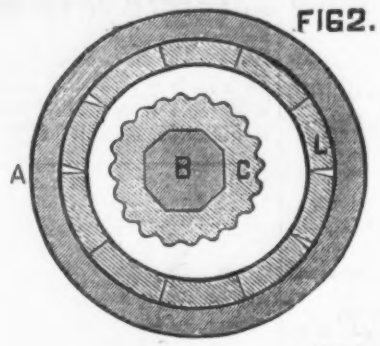
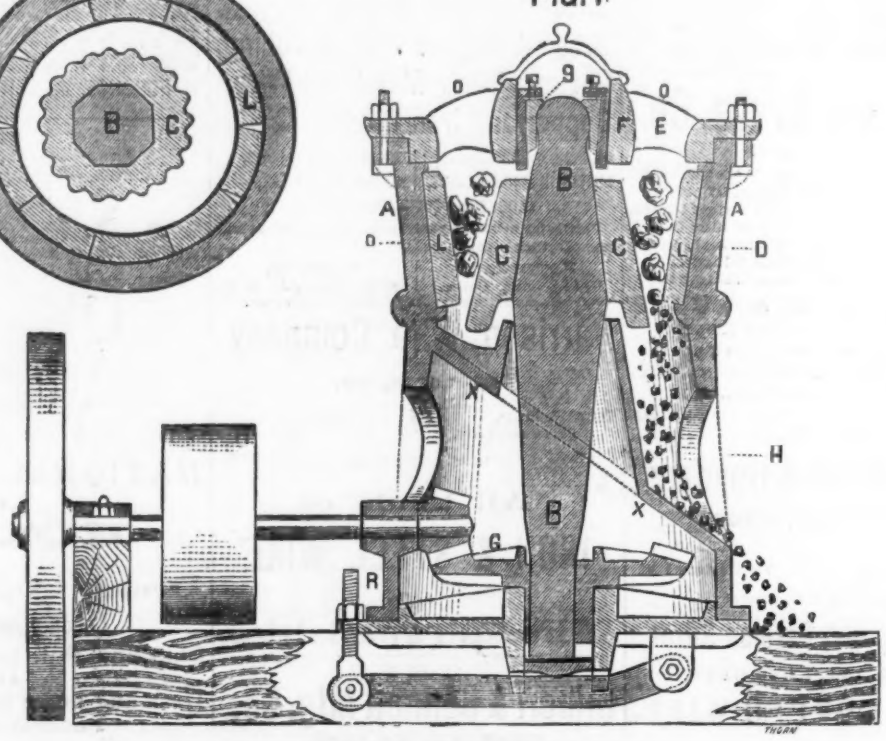


FIG. 1.



BROWN'S ROCK AND ORE CRUSHER.

Vannan's Expanding Mandrel.

Among late improvements in small machine tools we notice the patent expanding mandrel of F. H. Vannan, of Wilkesbarre, Pa. With this tool it is proposed to fit holes of any number of sizes by means of a single mandrel and appropriate bushings. The method of operation is quite simple, and readily understood from an examination of the accompanying plates. Fig. 1 represents the mandrel in use, the piece of work I, and one of the lower sections of the bushing E being partly removed to show more clearly the construction. The central mandrel A is shown tapering outward from the thread end B to the other extremity, which is flattened a little as usual to receive the set-screw of the carrier. Any number of bushings of different sizes may be used with this mandrel, each admitting of sufficient range of adjustment to adapt itself to a hole, whether of standard size or not. In fitting up the bushings they are bored the same size and taper as the mandrel and forced upon it; they are then turned to their respective diameters, which may be uniform the entire length, as in E, Fig. 3, or they may be turned in a series of faces of increasing diameters, as shown in Fig. 2, or to any required taper. After the size is stamped upon the bushing, it is then cut, as in the figure, into four or more longitudinal sections, as may be desired, each piece bearing the stamp indicating the size. When there is a series of faces, Fig. 2, the size is stamped upon each one of the series. G, G, G, Fig. 1, are washers of varying thickness, and large enough to be forced after the bushings by the nut H. In fitting the bushings into any piece of work they are first placed on the taper mandrel near the small end, and then entered into the hole as far as they will conveniently go by hand; the necessary washers are then put on and the nut screwed up until it forces the bushing up the taper and secures the article firmly on the mandrel. The object of this invention is to dispense with the large number of cumbersome, heavy mandrels, necessarily kept in all machine shops; to save time now lost in forcing articles upon them, and to avoid the expense of fitting odd jobs where standard mandrels will not do.

Fig. 1.

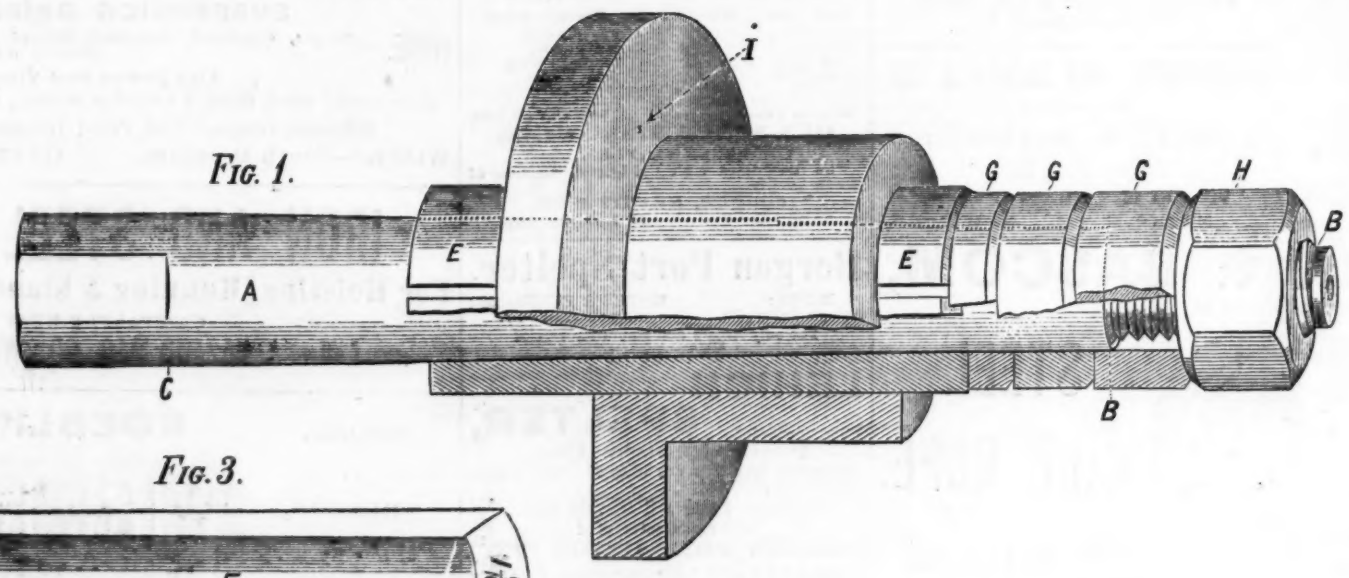


Fig. 3.

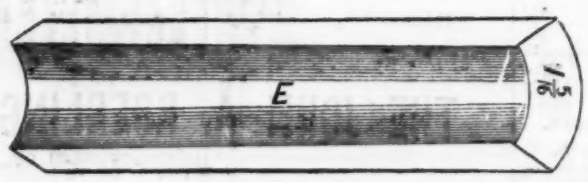
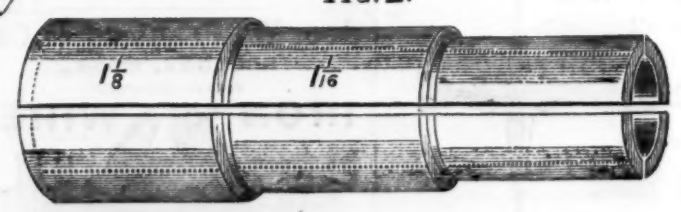


Fig. 2.



VANNAN'S EXPANDING MANDREL.

The Liffey Bridge at Dublin.

The new swing bridge over the Liffey at Dublin is described as a very interesting structure. The central pivot of this bridge is only 216 square inches, and the swing bridge itself is made of two massive wrought-iron main girders, 120 ft. long, with 64 cross girders, affording a central carriage way of 20 ft. in width. The hight of the main girders is about 9 ft. in the center of the swivel, sloping down to about 4 ft. in the ends. Outside the main girder, and resting on the transverse ones, are two foot-paths, each 6 ft. wide, having four-foot newel post hand-rails. A novelty in this design is the fact that flooring of the swivel forms the bottom flange of the girders. This flooring is composed of half-inch plates, closely riveted with 7-8 rivets. All the joinings in the ironwork have been carefully planed so as to secure the most complete fitting. Equality of movement is maintained and balance protected in turning the swing by four guide wheels 4 ft. in diameter, which run upon the circular roller path underneath the structure. The engine which sets the machinery in motion is situated on the east side of the bridge when in position for traffic. It is encased in a water-tight tank, and covered with an ornamental roof, the sides in the little house being formed of glass. Of the vertical type, with two 7½ in. cylinders, 12-in. stroke, and nominally of 15-horse-power, it is supplied by a 9 ft. boiler, also of the vertical pattern—the whole occupying very small space. Here the engineer has every appliance at hand for manipulating the bridge, all the levers and breaks being within reach of his arm as he stands in front of his engine. There is no danger of a mistake being made in regulating the turning of the swing if the operator uses either his eyes or his ears. Before him is an indicator which on a metallic disk points out the distance the bridge has traveled; and if his attention be not directed to this his notice will be attracted by the tinkle of an ingenious bell contrivance, which, acted upon by the movement of the swivel, sounds the record of each quarter revolution made by the bridge. The engine acts upon the "swing" by means of a shaft and malleable cast-iron pinion, with teeth 12 in. deep. This works into a circular rack over the roller path, 32 ft. in diameter, with a face of 10 in. and teeth 4 in. pitch, and thereby brings the causeway round. Should any accident happen to the engine, or should it get out of repair, the swivel can be worked readily by two men by means of a windlass, so that no delay or inconvenience could arise. There is powerful locking gear at each end of the bridge. Frictional rollers at each corner, fitting into metal sockets, are so arranged as to take the weight off the end of the bridge, and by lifting it about 1½ in. the rigidity necessary for cross traffic is secured.

Rapid Bridge Work.

In a letter to *Engineering*, published in the number for Nov. 8, Messrs. Clarke, Reeves & Co., say:

In your number for Aug. 30, 1878, we observe that you have illustrated very fully the iron bridges built by us on the line of railway between Quebec and Ottawa, in Canada, last year. The time occupied in constructing and erecting these bridges (alluded to in a subsequent article of the same series) deserves attention, as it will, we think, be admitted that but for the peculiar forms and connections of American truss bridge work, the great amount of bridging therein referred to could not have been executed in the time it was. All the plans did not receive the sanction of the engineers and the work of construction did not fairly commence until May 15, 1877. By Nov. 10, 1877, the trains were crossing the last bridge finished, that over the St. Maurice, so that 39 large spans were constructed, delivered by rail and canal boats, and in some cases hauled by team, in all between 400 and 500 miles, and erected ready for traffic in less than six months. These bridges extended over a line of railway of nearly 300 miles in length, and most of them were distant from towns or villages.

The riots referred to in your article of Sept. 20 delayed us not two months, as the writer says, but at least one month. This year we are making the remaining spans for the same railway, one of 219 feet, four of 153 feet, two of 125 feet, one of 103 feet, and one of 83 feet—nine in all; total length, 1258 feet. Order was placed in works Sept. 26, and all will be done and shipped by Oct. 26.

Railway managers in the United States and Canada are so accustomed to have bridges and other structures built quickly, that the American system of pin connections is the only one possible for spans of above 80 feet. When it is considered that in cases of impending floods a 150 feet span can be erected in one day, you can see why this system is a favorite one. Bridges of this sort have now been in use in the United States 10 years, subject to heavy traffic, and show not the slightest sign of "getting loose in the joints"—an effect predicted by those engineers who are opposed to the system.

Co-operative Trading in Boston.—Boston has a co-operative store which is organized somewhat after the English plan, and which is said to be favorably regarded by those who are familiar with its organization and plan of operations. All shareholders have credited to them, at the end of each quarter, interest on their capital at the rate of six per cent. per annum. If it then appears that there has been a net loss on the business, the amount of such loss is to be debited to the shares *pro rata*. But if there is a profit remaining over the interest allowance, that net profit is to be divided to the purchasers of goods from the store, whether they are or are not shareholders. The only advantage in this respect which the shareholder has over his neighbor who simply purchases his goods as at any other store, is that the profit is divided to the shareholder in proportion to the whole amount of his purchases, but to the non-shareholder in proportion to only one-half of his purchases. The store is expected to sell its goods at market prices, and to buy and sell only for cash, but the directors are authorized to exclude wholly or partially from participation in profits such articles as in their judgement pay little or no profits. The Boston store is evidently to be a modest one, as the capital is limited to $6000, divided into 1500 shares, at four dollars each. One of the advantages of store-keeping by a corporation of this kind is that it has a more or less fixed custom, and need not carry a stock much larger than the demands, and one of the disavantages is that the profits, divided in cash every quarter, may be accidentally or wilfully made fictitiously large by over-valuation of stock on hand, with resulting embarrassments when the truth is forced upon the stockholders and directors.

Wrecks on the British Coast.—On the coasts of the United Kingdom from July, 1876, to July, 1877, there were 4164 wrecks, casualties and collisions, involving the injury or loss of 5017 vessels. The mouth of the Humber, along the Norfolk coast, the Hasbro' Bank, and the space between the Kentish Knock and Sheerness, seem to be more dangerous to vessels than any other portions of the British seas. Spring and winter gales play sad havoc with vessels on that strip of coast between South Shields and Seaton Carew, where Sunderland, Seaham and Hartlepool are situated. The number of casualties off the Mersey and Clyde are few when compared with those occurring to vessels entering the Thames and Humber, and though accidents on the west coast of Great Britain are by no means small, the disasters on the eastern shores are terribly numerous. In the wreck abstract, published by the *Life-Boat Institution's Journal*, 776 deaths occurred during the period before mentioned. In 1877 life-boats saved 877 persons. A notable instance of courage and devotion is shown by an incident which occurred last April. A bark went ashore off Arklow. A life-boat crew, which had been out all night attempting to reach the wreck, were so exhausted that they could render, when near her, no possible assistance. Returning to Arklow, another crew was shipped, and though the men were perfectly aware of the danger, and that there was no possible chance of salvage, they bravely risked their lives, and saved 15 men from certain death. There seems to be no doubt that the number of casualties on the coast of England would be doubled were it not for life-boats. The Life-Boat Institution is now proposing the use of steam life-boats, which, it is believed, will be found superior to boats using oars.

During the last war 594,000 Russian soldiers went into Turkey. Of these 58,800 were sent back wounded and 62,150 ill, 31,000 sick went home to Odessa, 29,000 are still in hospital, 31,000 laid their bones in Roumania and 99,000 perished in Bulgaria.

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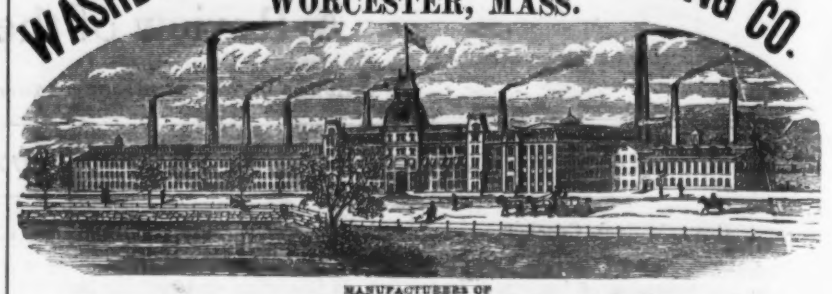

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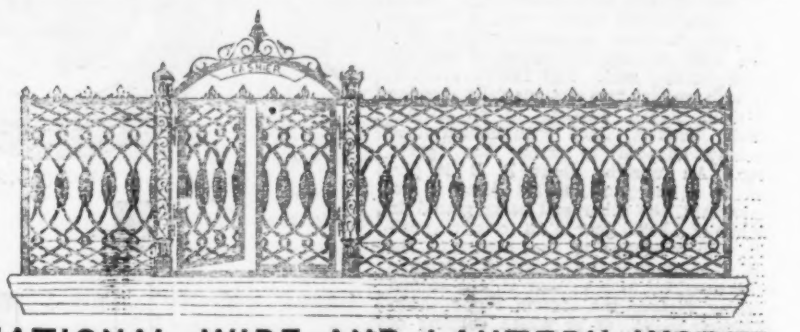

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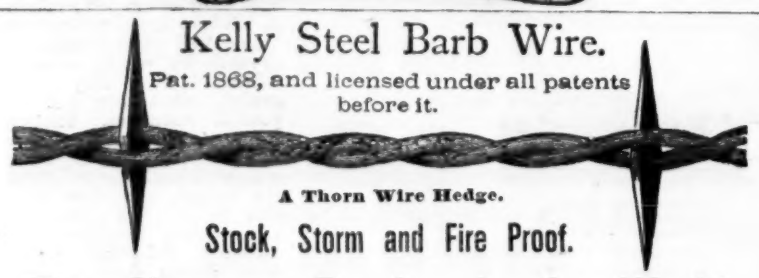

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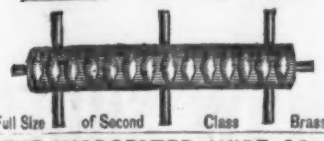

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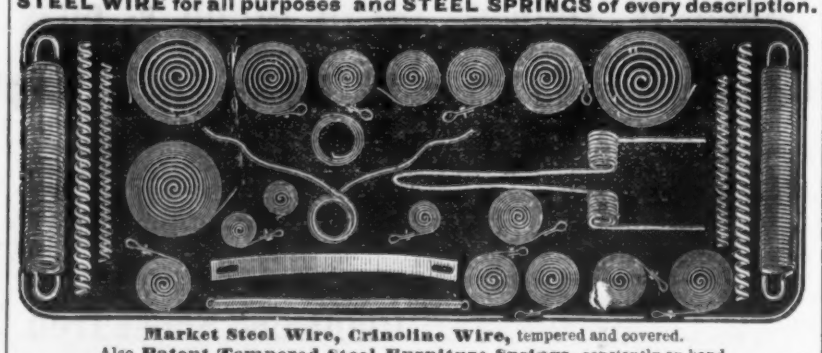

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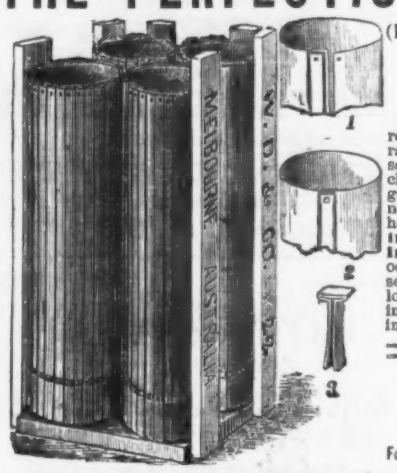

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Electro-Brassing and Bronzing.

We extract the following very interesting information from a recent article by Mr. Alex. Watt, in *Forge and Lathe*:

When cast-iron work is to be brassed, it must be first immersed in the potash bath (which should always be used boiling hot) for a short time, to remove greasy matter. It must then be rinsed and afterward placed in the pickling bath. After half an hour's immersion, the article should be again rinsed and well brushed with sand and water. If the black scale does not readily brush off, again place the article in pickle for a short time—indeed, until the oxide is easily removable. When thoroughly clean by brushing, again rinse well and suspend the article in the depositing bath. Cast iron always receives an electro deposit of any metal with great difficulty. It is necessary, therefore, to assist this sluggishness by increased battery power—otherwise a very poor, irregular coating will surely result. The current must be brisk for coating cast iron with any metal (not excepting copper, which is the easiest of all metals to deposit upon this class of work), but more especially in electro-brassing.

All things being equal, the characteristic tint of brass should present itself upon the surface of the work almost immediately after immersion in the bath. If this be the case, the action may be allowed to continue for a few minutes, or until a perfect film is obtained, when the energy of the operation may be somewhat diminished by raising the anode out of the bath a few inches, so as to expose a smaller surface (in solution) to the article to be plated.

There is always a brisk effervescence in the brassing bath when deposition is taking place, owing to the intensity of the current required for this purpose; and unless this evidence of activity shows itself, the probability is that brass of a good color will not be deposited. After the first thin coating is effected it is a good plan to remove the article from the bath, and if any defects present themselves, from want of proper cleaning, or otherwise, let the article be well brushed with sand as before, and, after rinsing, placed in the bath until sufficiently coated.

Articles which have received a stout coating of brass may be "dipped" in the ordinary dipping acid (a mixture of sulphuric acid, nitric acid and water, with occasionally a little nitrate of potash), which is to be procured ready-made at the drysalter's. Electro-brass articles thus dipped may then be lacquered in the ordinary way, that is, by gently warming the article and then brushing it over with a thin coating of gold or brown lacquer, according to taste.

Zinc articles receive a deposit of brass very readily, and, generally speaking, the deposit is of a very good color if the solution bath is in good order. In preparing zinc work, however, after it has been submitted to the potash bath for a short time and rinsed, it must be immersed, for a few moments only, in a pickle composed of hydrochloric acid 1 pound and water 1 gallon. The work should then be brushed with silver-sand and water. As zinc receives the deposit so readily, however, it will be necessary to expose only a moderate surface of anode to commence with, otherwise the operation will be too rapid and the work liable to strip. It is not often necessary to remove zinc articles from the bath to examine them if they have been well prepared beforehand by scouring with sand, as described, until they are sufficiently coated. There will be no harm, however, in lifting the work out of the bath for a moment to ascertain if all parts are properly clean, but it should be promptly returned to the bath before the surface has time to be acted upon by the atmosphere.

Steel articles also receive the brass deposit very readily when the solution is in good order, but the deposition must not on any account be allowed to take place rapidly, otherwise the work will strip to a certainty. A little practice will soon enable the operator to regulate the speed of his deposit to the class of work in hand, provided that he bears in mind the rule we have suggested for his guidance, namely, that deposition should begin almost immediately after immersion, but not too suddenly. Lead, pewter, Britannia metal, however, do not so readily receive the deposit, owing to their inferior conductibility. This class of work, therefore, must have vigorous battery power and a good surface of anode exposed when first placed in the solution; and when the deposit has taken place fairly all over, the power may be somewhat diminished, and the article allowed to remain undisturbed until finished. It is not a good plan to disturb the solution more than can be helped when lead or Britannia work is in the bath. Again, while this class of work is in solution, no other articles composed of a different metal should be immersed in the bath. For example, if steel or iron and lead articles are placed in the bath at the same time, it is not unlikely that the former will receive the deposit too quickly, while the latter may not be coated at all, or only partially so. If, however, it is not convenient to devote the bath to one metal only, the safest plan is to place the lead or pewter articles in the bath first, and when these have become coated, the steel or iron work may be suspended on the same rod if necessary—taking care, however, to keep them as far apart as possible.

In brassing fender and stove work, which unfortunately is generally required to be done at a very moderate price, the object is to make the article look as well as possible with the smallest amount of metal. When we consider that fenders are sometimes electro-bronzed for 2/ or 3/ each, it is not possible, with the labor required to make them look well, to give more than a mere film of deposit. This may generally be done in half an hour, or even in less time, if the current is vigorous and the solution in good order. After pickling and scouring with coarse sand and water, the fender or stove should be rinsed and examined to ascertain if it be sufficiently clean for the bath. As soon as the article is coated well all over it is to be rinsed in boiling water, and then placed in hot sawdust (mahogany sawdust is the best for this purpose) until required to be bronzed. This operation is done as follows: Having made up a thin paste of black lead and rouge for warm bronze, to which may be added a small quantity of sulphide of ammonium, this is to be laid well over the article with a soft brush, taking care to cover every crevice. Now place the article before a fire until nearly dry. It is then to be briskly brushed over with a large soft brush until quite bright, and all the loose powder removed. With a piece of leather placed on the forefinger and slightly moistened, touch up the prominent parts or high lights by rubbing until the metal becomes visible at those points. If this is done artistically a very pleasing effect of light and shade will be produced. The fender or stove front should now be made moderately warm, and a thin coating of methylated varnish brushed lightly over it. In a few moments after the varnish will be dry and the operation complete.

When the yellow bronze or, more properly, brass, is deposited on work of this kind, the green bronzing powder should be used, with the addition of a little sulphide of ammonium. In very high-class work, the solution of chloride of platinum may be substituted for the ammonium salt. The tone of the bronzing may be varied greatly by applying more or less rouge for the warmer tint, or by increasing the proportion of plumbago and sulphide for the darker tone. The addition of yellow chromate of lead will impart a greenish tint to the brass deposit, which is very pleasing in some patterns, especially where there are leaves or flowers.

Two Large French Iron Works.

The Schneider Iron Works at Creusót—some 250 miles southeast of Paris—represent an annual production of 190,000 tons of iron and steel, wrought into rails, plates, forgings and finished engines. As early as 1772 a cannon foundry was established here, but very little was done to utilize the neighboring coal deposits for manufacturing purposes until 1836, when the existing coal mines and iron works were turned over to Messrs. Schneider. Within five years four blast furnaces were at work, a forge containing 50 furnaces was in operation, one of the first steam hammers ever made had been introduced, and a railway transported the products of the factory to the nearest canal. At the epoch of the Crimean war the works had attained a productive capacity of 150,000 tons of iron, which was taxed, however, to the utmost by the demands for material of war. By and by the mines of Mazenay were purchased and connected with Creusót by a private railway 22 miles long, and others were added until the total number of workmen employed in the five groups of ironstone mines now reaches nearly 2000, while the total annual production of crude ore is about 400,000 tons. Besides this, supplies are drawn from mines owned by the same firm in Spain and Africa. On the other hand, the yield of coal in all the Schneider collieries for the year 1877–'78 is returned at 549,000 tons, while the coal mines at Creusót alone give employment to 1200 workmen. Returning to the plant and machinery, we find that in 1869 works on a very extensive scale were erected for the manufacture of Bessemer steel. At present the firm are owners of 27 locomotives and 1518 wagons, and they employ 281 stationary engines with an aggregate of more than 13,000 horse-power, 58 steam hammers and 1050 machines of various other kinds. The area covered by the buildings, depots and workmen's houses is 1031 acres, while the total number of workmen employed is 15,252, distributed through the several departments. In a word, a flourishing city, which may be termed the Pittsburgh of France, stands on a site occupied by a small hamlet in the middle of the last century.

No less than three establishments are owned by the Messrs. De Wendel, the works at Hayange having been in the possession of the family since 1705, and the other two forges having been opened within the last 50 years. These combined produced last year 467,000 tons of iron ore, 322,000 tons of coal and 145,000 tons of pig iron. It appears that the manufacture of wrought-iron sleepers here receives much attention, especially what is known as Hilf's system of iron permanent way, of which there are said to be over 3000 miles (equivalent to 300,000 tons) already laid upon the Continent. According to the testimony of those who have visited these works, the perfect order and cleanliness presented a most favorable contrast with the state of things in English establishments. It was observed likewise that the best and most recently improved forms of machinery had been imported from England, or had been constructed in accordance with the most efficient English practice. When this spirit of enterprise is considered in conjunction with the conditions above noted tending to cheapness of production, it will be understood why French iron and steel workers are beginning to wrest orders from their English competitors in the markets of the world.

Dakota will be the next applicant for admission into the Union of States. It is claimed that the territory has a population of 125,000, composed mainly of farmers and business men from the Northern States. On this showing, according to precedent, Congress should pass the customary act of admission. But the precedent is a most mischievous one. Nobody in Dakota will be benefited by the new condition, except the politicians who would get fat offices. The people would be saddled with heavy taxes without any compensating advantages. Besides, the larger States cannot afford to weaken their influence in the Senate by the addition of any more small constituencies, who exert in that body power equal to their own.

The use of Bleckly's four-high wire mill at the works of the Pearson & Knowles Coal and Iron Company, Warrington, has been attended with very satisfactory results. In one week, with two heating furnaces and nine and a half shifts of ten hours each, the product was 226 tons 15 cwt. 2 qrs. of No. 4 (3-16ths full) wire rods, ranging in weight from 50 to 70 lbs. per rod, the highest turn's work being 24 tons 18 cwt., and the lowest 20 tons 4 cwt. 3 qrs. The total production of this one mill during a fortnight was 432 tons 12 cwt. of No. 4 rods.

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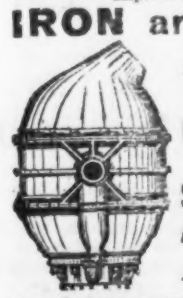

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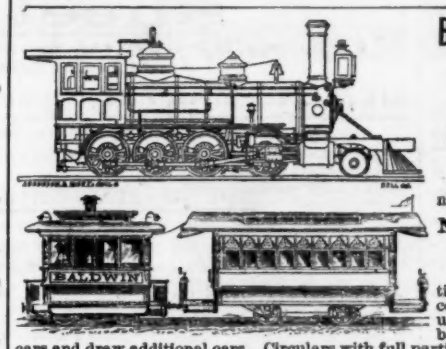

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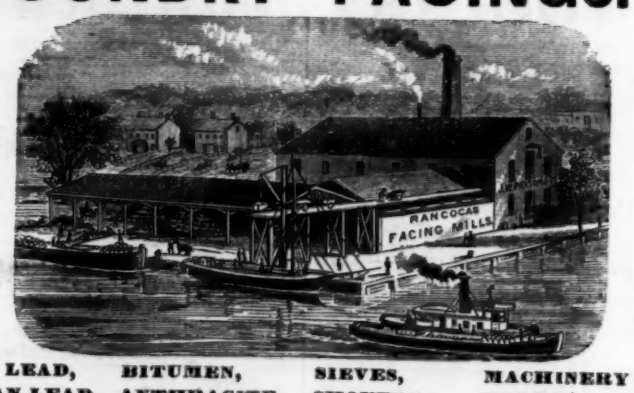

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Development of the Steam Engine.

I.

The student who has gained a general knowledge of the steam engine and its history from technical works upon steam engineering and the steam engine and from the lives of the engineers who are identified with it, cannot help experiencing a feeling of regret that there should have been so much inexplicable ill luck in it all. When, however, we take up the history of the steam engine and trace its growth as a matter of separate investigation, considering each step in its development in connection with the demands of the time, the local needs and advantages, a new light floods the subject. The history of the steam engine to be intelligible must be treated according to some scheme. In the treatise on which we have drawn for a large portion of our materials* the following is the plan adopted:

1. The steam engine as a simple machine. This is divided into two periods—the first of speculation, the second of experimental application.

2. The steam engine as a train of mechanism.

3. The development of the modern steam engine.

4. The second period of application of the modern engine.

5. The steam engine of to-day.

When we attempt to arrange the facts of history with a scheme like this we find they have acquired a new significance. At every step the philosophy of history throws a flood of light upon the subject, and gives old and familiar facts the charm of absolute novelty. Failures and successes which, both to the general student and the engineer reading casually, seemed utterly inexplicable, fall into place and are perfectly in accord with the general tendency of mechanical progress. An example is found in the fruitless efforts of the Marquis of Worcester to introduce his "water-commanding engine." Savary, only 35 or 40 years later, and with a machine which was probably not very different in construction from that of the Marquis of Worcester, made a success which was very creditable. The reason seems to be very plain when we take into consideration the fact that in the interval of 40 years the difficulties attending mining in Cornwall were rapidly increasing, on account of the greater depth of the mines and the quantity of water encountered. Because the mechanical wants of Great Britain did not include the steam pump in any form, the Marquis of Worcester died poor with only a gleam of success to cheer him, and passed into history as a man who lived 50 years ahead of his time. John Fitch is another example of a man out of place and ahead of his time. Probably from a mechanical point of view he was as deserving of success as Fulton; but when he built steamboats on the Delaware, Philadelphia had no use for them. Mechanical success would have made no difference. Fulton was only successful when he selected a field of operations where a steamboat could be commercially useful and valuable. Probably at that time there was hardly as promising a field in the whole world for the steamboat as the Hudson. A large traffic carried on entirely in sailing vessels, a narrow, tortuous river, where highlands and mountains made baffling winds the rule, were some of the elements which made the Hudson above all others the place for the first success of the steamboat.

From a glance at the works of the men before Watts' time we are impressed with the fact that there were giants in those days. The work that the Marquis of Worcester, Savary, Papin, Newcomen and Smeaton accomplished was wonderful, and the wonder grows when we see with what flimsy materials and inefficient means they worked.

The steam engine as a simple machine, during the period of speculation from its earliest mention, some 200 years before Christ, to the time of Worcester in 1700, was little more than a toy, some times powerful and dangerous, at others a mere trinket. No matter how perfectly it might have been conceived in the brain or executed by the hands of the early philosophers, there was absolutely nothing for it to do, save perhaps opening temple gates, moving idols or performing other miracles for the priests. A toy it remained of necessity. Even when Blasco de Garay's tug boat was proposed and executed, the world's commerce was not sufficiently in a hurry to make it worth while to tow a ship out of a harbor against a head wind. To wait a week or more for a fair wind made little difference in a voyage where a ship's speed was not greater than that of a man walking leisurely. Toward the middle of the 17th century the world began to have work to do which was beyond the power of man or the domestic animals. Men naturally turned their attention to utilizing the force of steam, and for the last fifty years of the century a great deal of work was done in the way of designing forms, estimating force, experimenting with boilers and gaining a general knowledge of the action of steam. The Marquis of Worcester stands among the first of those who utilized the force of steam in the production of work. We know little of the machine he used, but we can judge from what immediately followed, as well as from his works, the general scope of his inventions and the form of apparatus he employed.

The necessity which began to be felt from 1675 to the end of the century for some means of raising water from mines, was making serious demands upon the engineer. Water and windmills could not do the work in all cases, and hence Savary and Desaguliers found encouragement in perfecting, improving or designing steam pumps which, in their general principles, much resembled those of the Marquis of Worcester. Toward the close of the 17th century Denys Papin, the inventor of the digester, produced what seems to have been the first steam engine approaching the modern type; that is, a machine which by the use of steam produced power by means of a cylinder containing a piston. He also contributed to the advancement of the steam engine by the invention of the safety valve, and may be said in one sense to be the father of high pressure. He was a little in advance of his time, for he proposed to produce steam motors, while the want of the age was a steam pump.

At the beginning of the 18th century everything was ripe for the application of a steam pump. Mines going deeper and encountering more water could no longer be profitably worked unless some cheap method of water raising could be found. The market for the steam pump was already made. "Every element of the modern type of steam engine had been separately invented and practically applied. The character of atmospheric pressure, and of the pressure of gasses, had become understood. The nature of a vacuum was known, and the method of obtaining by displacement of the air by steam and by the condensation of the vapor was understood." The scientific knowledge had been obtained, steam boilers were already familiar to mechanicians and they could be made to stand considerable pressures, while Papin's invention gave a reasonable safety. Nothing seemed to be needed but a practical application of the elements at hand. In Newcomen's engine of 1705 we have the steam engine, or more correctly the steam pump, in its modern form—a steam cylinder, a separate boiler and separate pumps. The atmospheric engine, although crude and wasteful, could do the work with great economy as compared with horses; moreover, there was no limit to the quantity of work which it could be made to do. In a few years steam pumps of the improved form found their way into all the more important mines in Great Britain. Toward the close of the century many of these pumps were used in furnishing power. They raised water by which water wheels were driven, and from the latter mills, &c., obtained the desired power.

As we trace the history of the introduction of these steam pumps it seems wonderful what a large proportion of the world's work at that time, and even to-day, consisted of moving or raising water. Pumping out mines, lifting water to supply water wheels, draining low lands, emptying docks and supplying towns were some of the uses to which the new machines were applied. In a few instances the old atmospheric engine had been used for supplying power direct, and blowing engines, and in one or two instances rotative engines, had been built. Smeaton, toward the third quarter of the last century, did much toward improving the economy of the atmospheric engine, as it is sometimes called, and greatly increased its efficiency. With the history of the old atmospheric engine or pump the first stage in the history of the modern steam engine was finished, the application of the steam engine was well begun and work in abundance was found for it.

* A History of the Growth of the Steam Engine. By Robert H. Thurston, Professor of Mechanical Engineering, Stevens Institute of Technology. New York: D. Appleton & Co., 1878: pp. 490.

The Cincinnati Coal Trade.

From advanced sheets of the annual report of Col. S. D. Maxwell, Superintendent of the Chamber of Commerce of Cincinnati, we take the following interesting review of the coal trade of that city for the past year:

The total receipts of coal of all kinds during the year have been 38,892,229 bushels, in comparison with 39,622,634 bushels in 1876–77—showing in the aggregate a very slight falling off. Of the grand aggregate there have been received by river 36,798,454 bushels, or 94.6 per cent. of the whole, in comparison with 37,332,716 bushels, or 94.2 per cent. in 1876–77; and by rail, 2,093,775 bushels, or 5.4 per cent., compared with 2,289,918 bushels, or 5.8 per cent. in the previous year. Of the whole receipts there came from Pittsburgh 26,743,055 bushels, compared with 28,237,572 bushels the previous year; from the Kanawha and adjacent localities, 6,767,391 bushels, in comparison with 3,953,994; from the Ohio River mines and contiguous territory, 3,288,008 bushels, compared with 5,141,150; from the Hocking and Muskingum valleys and other interior mines of the State of Ohio, 1,570,241 bushels, in comparison with 1,741,508; and from the anthracite region and from all other sources, 523,534 bushels, compared with 548,410 bushels.

The relation which the quantities from the various sources of supply sustain to the whole quantity in the past two years respectively, is as follows: Pittsburgh, 1877–78, 68.7 per cent.; 1876–77, 71.2 per cent. Kanawha, &c., 1877–78, 17.4 per cent.; 1876–77, 10 per cent. Ohio River, &c., 1877–78, 8.5 per cent.; 1876–77, 13 per cent. Hocking and Muskingum valleys, &c., 1877–78, 4 per cent.; 1876–77, 4.4 per cent. All other sources, 1877–78, 1.4 per cent.; 1876–77, 1.4 per cent.

The demand for anthracite coal is steadily increasing under the stimulation of low prices consequent on cheap freight rates. The price for Wilkesbarre and Lehigh coal, delivered, ranged during most of the year at $7.50 to $8. In the latter part of the period the price declined to $6.50 to $7.50. The price for these coals ranged during most of the year, at wholesale, from $6 to $7. The average quotation, delivered, was $7.58 per ton, compared with $8.33 in the preceding year.

The business in coke has been about the same with the previous year, with the exception of the crushed, which is steadily growing in favor, and the consumption of which has sensibly increased. Larger quantities of the crushed coke have gone to the country than usual.

The quantity of coal distributed to the interior has not been equal to the previous year, having been 4,973,300 bushels, in comparison with 5,738,700 bushels in 1876–77.

The following table shows the average annual quotation at Cincinnati for the various kinds of coal during a period of four years:

Kinds.—Per bush.	Arrival.			
	1877–78.	1876–77.	1875–76.	1874–75
Pitts (Y'gh'ry)	7.86	7.96	8.3	9.32
Ashland	6.12	6.75	7.09	8.3
Ohio River	5.82	6.19	5.97	6.63
Hocking Valley	†9.3	†9.98	†10.05	†9.94
Raymond City	*6.5	*7.3	*7.62	*8.35
Musk'm Valley	*9.17	*9.43	*9.72	*9.94
Cambell Creek	7.1	....	....	....
Cannel	13.0	15.73	16.14	17.3

* On arrival.

† At elevator. The averages for Hocking Valley coal for 1874–75 are from Jan. 12, at which date the quotations for this kind of coal commenced. The quotation for the entire year of 1874–75 would probably be slightly above these figures.

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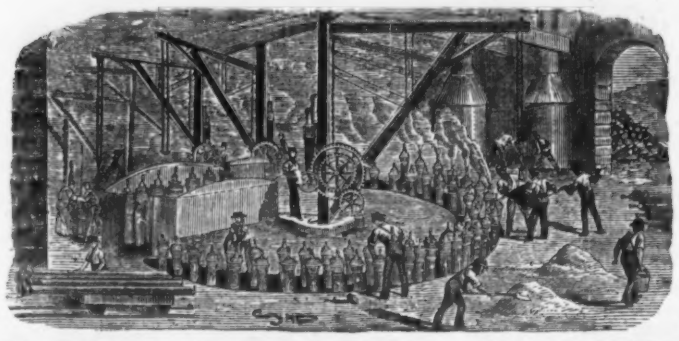

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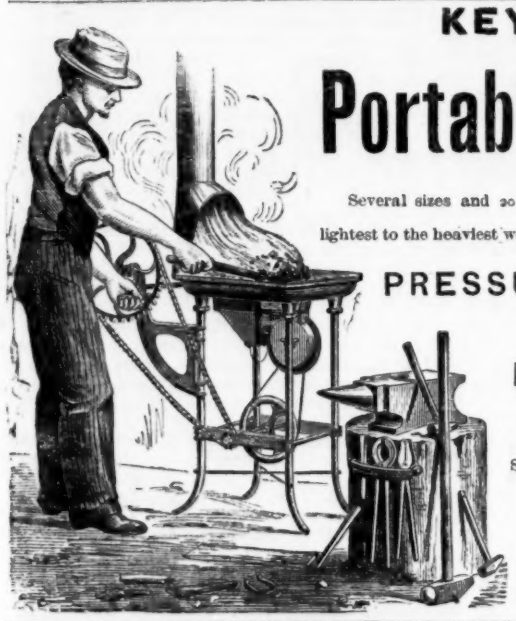

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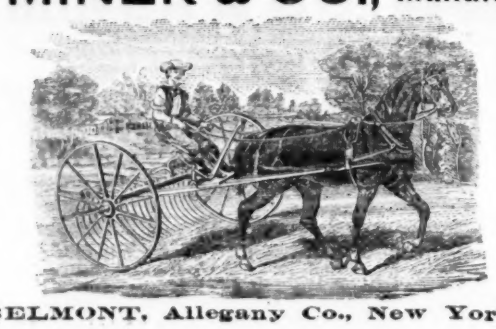

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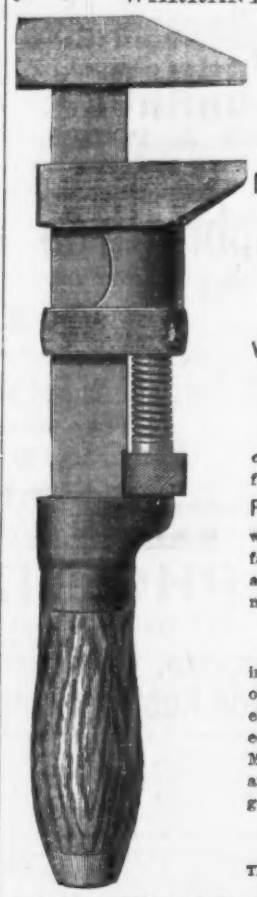

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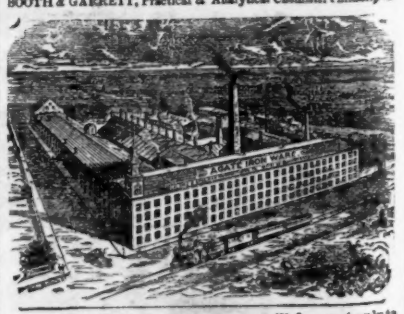

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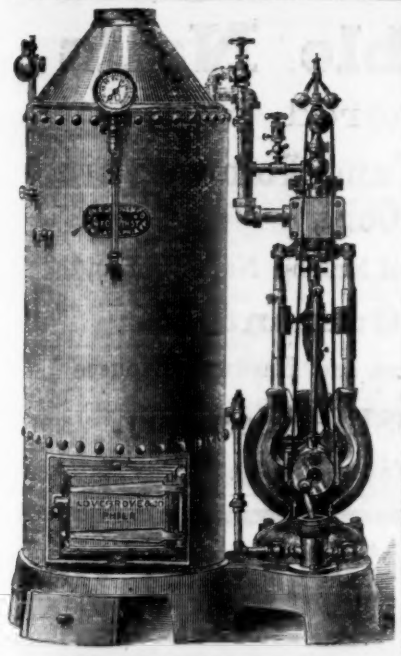

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Petroleum Fire Tests.

We take the following from an address delivered before the Legislature of Michigan, by Prof. R. C. Kedzie, M. D., President of the State Board of Health and Professor in the State Agricultural College.

OIL THAT IS SAFE.

The most important question is, What is a safe oil? I think you will all concede that oil that will bear our test is safe. For nearly two years in which our test has been enforced, not a life has been lost or a serious accident occurred by the use of such oil. Will oil of a lower grade be equally safe? Most emphatically, no! Will 120 degrees oil be safe enough for common use? Ninety-nine persons may use it without accident, but the hundredth man may have an accident and go up in a chariot of fire. In estimating the degree of safety required for any oil in general use, we must consider the accidents which are liable to happen: chimneys will break or fall off, lamps will break by dropping and otherwise, and we must have an oil that will be safe when such accidents occur. The brass fittings of lamps become heated, and when the oil is splashed against the heated parts, explosive vapors will form if the oil is of low test. Accidents are very liable to occur when the lamp is partially empty and is carried in the hands. The following case will illustrate how such accidents most frequently occur:

The Dubuque *Times* says that a lamp explosion occurred in a house in Fourteenth street, in that city. A little colored girl employed in the family went to the kitchen in the evening to light the fire. She then took the lamp from the table and started to return to the sitting-room, and before she got out of the kitchen the lamp exploded with the force of a gun-shot, scattering fragments of glass all over the room. One piece struck the little girl on the cheek, cutting a gash nearly 2 inches in length and deep enough to bleed profusely, and others tore the skin from the fingers of the hand which carried the lamp. Fortunately the light was extinguished by the bursting of the lamp.

I have made many experiments to determine the comparative safety of such oil as the people are petitioning for, and the oil that our laws now require. I have filled lamps with the "Michigan-test" oil and others with the "Headlight" oil. These lamps were left to burn in a warm room for a time, and then broken without extinguishing the flame. With our oil the flame was either extinguished, or a long time ensued before the body of the oil took fire; with "Headlight" oil the flame rapidly extended to the oil and burned fiercely. I am satisfied by these direct experiments, where the conditions of an accident were as accurately reproduced as possible, that our "Michigan-test" oil is far safer than any oil of a lower test.

WHY LAMPS EXPLODE.

Some persons seem to think the explosion of a kerosene lamp is caused in the same way as a boiler explosion, viz.: By the pressure of the vapor of the oil inside the lamp. In rare instances explosions may be caused in this way; for example, where the ignited oil overflows the lamp and the lamp is enveloped in flame. But explosions usually occur in another way, viz.: Where the vapor of kerosene is mixed in proper proportions with air, and thus a true explosive mixture is formed, which will explode with the force of a gun shot when fired by flame. This explains why a lamp is in more danger of exploding when only partially filled with kerosene, because a larger amount of space is filled with the explosive mixture; it is the same as a larger load of powder in a gun.

Many persons suppose that there can be no danger of a lamp explosion unless the whole body of the oil in the lamp is heated to the flashing point; that because the temperature of our rooms never rises to 120 degrees there can be no danger in using oil whose flashing point is 120 degrees. But Dr. Baker, secretary of the State Board of Health, has proved by experiment with lamps that an explosive mixture may form and the lamp may explode while the body of oil in the lamp is not above 85° F. The temperature of the body of oil in the lamp is not the only factor to be considered, because different parts of the lamp become very unequally heated. If you will touch the brass collar of a lamp which has been burning for some time you will find it quite hot, and the tube supporting the wick is still more strongly heated. The formation of vapor will be determined by the hottest part of the lamp which comes in contact with the oil. When the combustion is imperfect from any cause the brass fittings of the lamp become excessively heated. Dr. Baker found in his experiments that when the chimney was removed, by breaking or otherwise, and the lamp continued to burn, the temperature of the brass collar rose very rapidly in every instance; in one case in 14 minutes it rose to 161°, and in another case in 10 minutes to 155° F. In this last instance very rapid explosions occurred by the side of the wick, and to prevent the whole lamp from exploding the light was extinguished. In none of these experiments did the temperature of the body of the oil rise above 85° F. Many persons on leaving a room "turn down the lamp" to save oil, but such economy is very liable to cause a lamp explosion, which is anything but economical. I know of a case in Charlotte which illustrates the danger of this practice. A lamp in a store was turned down during the absence of the clerk, a person passing saw the lamp explode, and by promptly breaking open the store he extinguished the fire. If a light is not needed in a room either extinguish the lamp or leave it burning with the usual blaze.

METHODS OF INSPECTION.

Permit me to call your attention to the methods of inspecting oil, and to explain why such different results are reached by Michigan and Ohio inspection. Many persons are puzzled to know why oil that will pass Ohio inspection at 150° will only bear Michigan inspection at 120° or even 115°. The discrepancy is to be explained by the difference in construction and use of Michigan and Ohio oil testers. In all oil testers, so far as I know, the oil to be tested is heated in a water bath, and the temperature of the oil is measured by a thermometer whose bulb is just covered by the oil. In these respects the oil testers of both States agree. In the Ohio tester—what is called the "commercial test"—the oil fills the containing vessel brimful, and there is no screen or covering to prevent the escape of the vapor as it forms; the least movement of the air tends to dissipate the vapor. Moreover the vapor of kerosene is more than twice as heavy as air, and when it forms it tends to fall down the sides of the vessel, and will not accumulate in large quantity over the oil unless it forms quite rapidly, becoming heaped up on its surface. If a lighted splinter be passed rapidly over the oil half an inch, an inch or more above its surface, it may fail to ignite the vapor even when it is escaping freely from the oil. The distance above the oil at which the lighted splinter must be passed is left entirely to the judgment of the operator, and hence the results of inspection are largely within his control; if he wants it to pass a high test he has only to raise his lighted splinter higher above the surface of the oil, or dash it past the surface more rapidly.

In the Michigan tester, a sample of which is before you, these sources of error and uncertainty are avoided by a vapor chamber over the oil. This chamber is one inch deep, and is covered with a copper plate, so that the heavy vapors cannot escape. When a lighted match is passed into this vapor chamber, if vapor is present in sensible quantity, a flash will reveal its presence. This vapor chamber represents the space inside a lamp which is not filled with oil. An oil that will flash at a given temperature in this vapor chamber, will explode at the same temperature in a lamp if flame is applied, because the flash in the vapor chamber is an explosion. The flashing temperature of an oil in our tester represents the exploding temperature of the same oil in a lamp under favorable circumstances. To show more clearly this relation of the vapor chamber in our tester to the empty space in a partially-filled lamp, Dr. Baker has constructed a water bath and used this lamp (which has a side opening for filling the lamp) for an oil tester. If the lamp is partially filled with oil, a thermometer placed in the oil through this opening for the wick, the whole placed in this water bath to heat it, and then a lighted match passed into the empty space of the lamp through this side aperture, we have all the conditions of our Michigan oil tester, and the oil may be tested in this apparatus the same as in our oil tester. You thus see that the empty space in this lamp represents the vapor chamber in our oil tester. We often speak of this part of the lamp as empty. It is not empty, but is filled with a mixture of vapor of the oil and air, and if these are present in the right proportions, they will explode in the lamp the same as in the oil tester.

Since the Michigan tester prevents the escape of the vapor as it forms, and since the lighted splinter must be plunged into the space where the vapor is, our tester will mark a much lower temperature of inspection than will the Ohio tester. Oil that will bear our test of 140 degrees will usually pass Ohio inspection at 175 degrees. Our method of testing is much more accurate, the results are less within the control of the operator, and it bears an intimate relation to the actual conditions of a lamp while burning. It has reason and fitness, whatever the Ohio method has. Cleveland inspectors confessed that their method was too largely within the control of the inspector, but "the Michigan test is the most accurate instrument yet invented—you cannot make it vary more than a degree or two." When the oil dealers rail at our "close tester," you must remember that its crying sins are that it is accurate and unvarying, and that it indicates the limits of safety of oil when used in a lamp!

Note.—We do not think that even the 140 degrees test of Michigan is as high as it should be for perfect safety. A large portion of the commoner sorts of the lamps in the market will, when they have been burning for a considerable length of time, be found to conduct the heat downward to such an extent that the temperature of the upper part of the lamp will be far above 140 or even 150 degrees. We are of the opinion that 200 degrees is a much better and safer test than 140 degrees. For our own use we prefer the heavy oils which do not flash below 300 degrees or 350 degrees, and do not burn at less than 600 degrees. Such oils are as safe as lard or whale oils.—[*Ed. of The Iron Age.*

A Self-Feeding Nail Machine.—We condense from the Pomeroy (Ohio) *Telegraph* the following description of a rotary self-feeding nail machine, invented by Mr. Royal Grant, of Middleport, and now in operation at his machine shop in that town. This machine is the result of several years of study and experiment by Mr. Grant. The machine which is completed cuts fourpenny nails, but it is said can be regulated to make two other sizes. It makes nails at the rate of 240 per minute, and they are equally as perfect as any made by the ordinary hand-fed machine. It is claimed that it will make fewer imperfect nails than the others, as machinery is always more exact and regular in its operations than the human hand. The knives are set upon a revolving cylinder and two nails are made at each revolution. The plates are fed perpendicularly into a spout something like that of a corn sheller, the feeding being very easily done and not requiring a great deal of attention. The operation of the machine is automatic, performing all the operations of handling the plates, cutting the nail, heading it and dropping it after the plate is once put into the spout. The small amount of waste is another noticeable feature. The plate is worked up much closer to the end and what is left is thrown to one side, not falling among the nails. It is claimed that these machines can be furnished at a cost not exceeding the price of the old fashioned hand-feeding machines, they being quite simple in construction and having no very complicated machinery.

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Rubber supplied with enlarged edge and instructions to enable Car Manufacturers, Carpenters, Builders and far off trade to make slots in Sashes, Doors, Moldings, &c., and thus make perfect Weather Strips.

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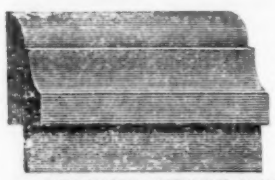

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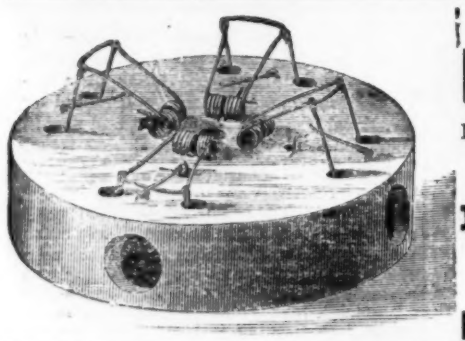

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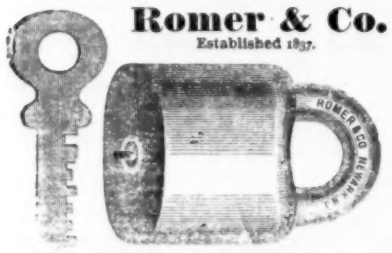

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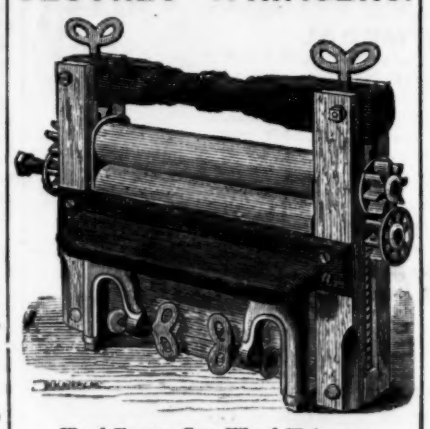

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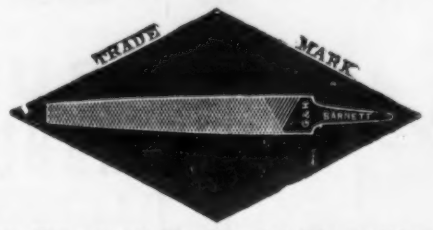

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Warranted CAST STEEL. 187 Tenth Street, Williamsburgh, New York.

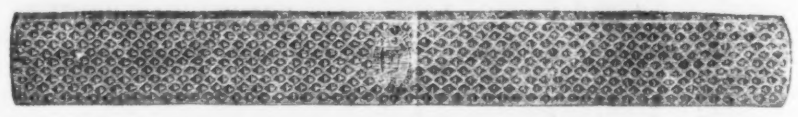
All descriptions of Files made to order. Price List mailed on application. Established 1860.

HELLER & BROS.,

MANUFACTURERS OF CELEBRATED

AMERICAN HORSE RASPS AND FILES,

NEWARK, N. J.



In view of the many so-called improvements and ingenious arrangements of the teeth of Horse Rasps made within the last few years, we take occasion to recommend our own Horse Rasps, made of the best American Steel, all **hand cut** in the **old style** by the most skilled mechanics; and we guarantee them to be unequaled in the market, as is best evinced by the unanimous verdict of all the skilled horseshoers who are using them for the last fifteen years all through the United States.

For sale by the leading Hardware and Iron Dealers in the United States and Canada.

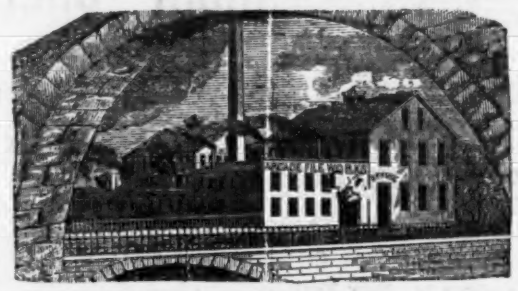
ESTABLISHED 1848.

C. T. DRAPER & CO.

Sing Sing, N. Y.

Manufacturers of SUPERIOR

HAND CUT



FILES and RASPS

Made from Best

ENGLISH CAST STEEL.

Quality guaranteed by written warranty when required.

AUSABLE HORSE NAILS

POLISHED OR BLUED.

HAMMERED AND FINISHED

The Ausable Nails

Are Hammered Hot,

And the Finishing and Pointing are Done Cold,

Thus Imitating the Process of Making Nails by Hand.

Quality is **Fully Guaranteed.**

For Sale by all Leading Iron and Hardware Houses.

ABRAHAM BUSSING, Secretary,

4 Warren Street, New York.

Philadelphia Screw Co.,

MANUFACTURERS OF

Iron and Brass

WOOD SCREWS

Of Every Description.

OFFICE AND FACTORY,

N. W. Cor. 12th & Buttonwood Streets, Philadelphia, Pa.

Complete assortment at lowest market rates.

A. FIELD & SONS

TAUNTON, MASS.,

MANUFACTURERS OF

AMERICAN AND FRENCH

WIRE NAILS,

TACKS, SHOE NAILS,

And Every Variety of Small Nails.

Offices & Factories at Taunton, Mass. Warehouse at 78 Chambers St., New York,

where may be found a full assortment of Tacks, Brads, Wire Nails, &c., for the accommodation of the New York Wholesale and Jobbing Trade.

☞ Any variations from the regular size or shape of the above-named goods made from sample to order. ☜

A SILVER MEDAL has been awarded above goods at the Paris Exposition, being the only medal awarded any American manufacturer of Tacks and Wire Nails.

Hoisting Machinery

MANUFACTURED BY

CRANE BROTHERS MFG. CO.,

Chicago.

The Upright Family Scale

PATENTED.

Put up in neat pasteboard boxes, and packed one dozen in a case. No charge for cases.

With Tin Dish.

Weighing 12 lbs. by ¼ lb.

List $16 per Dozen.

Liberal Discount to the Trade.

This Scale has an attachment for **Taking the Tare.** Just the thing for family use.

Manufactured by

JOHN CHATILLON & SONS,

89, 91 and 93 Cliff St., NEW YORK.

Geo. M. Eddy & Co.,

351 & 353 Classon Ave., Brooklyn, N. Y.

Manufacturers of

MEASURING TAPES.

Of Cotton Linen and Steel.

For all purposes for which Tape Measures are required.

Only manufacturers of

Paine's Patent U. S. Standard Steel Measuring Tapes,

Pat. Spring Measuring Tapes

of Linen and Steel.

FINE TEMPERED STEEL SPRINGS,

FINE TEMPERED STEEL BAND SAWS,

From ¼ inch wide upward. Warranted tougher than any other Band Saw. Catalogues on application

PRIZE MEDALLISTS:

London, 1862; Oporto, 1865; Dublin, 1865; Paris, 1867; Moscow, 1872; Vienna, 1873, and **only Award and Medal for Self-Coiling Steel Shutters at Centennial Exhibition, Philadelphia, 1876.**

CLARK & CO.,

ORIGINAL INVENTORS AND SOLE

PATENTEES OF

Noiseless Self-Coiling Revolving

STEEL SHUTTERS,

FIRE AND BURGLAR PROOF.

Also Improved

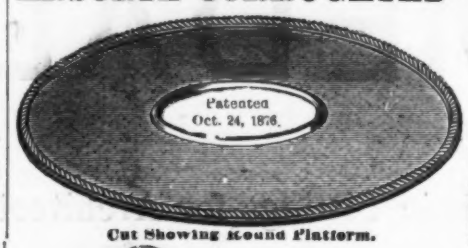
Rolling Wood Shutters

Of various kinds. Clark's Shutters are the **Best and Cheapest** in the world. Are fitted to new *Tribune* Building, Lenox Library, Delaware and Hudson Canal Co.'s Building, Transatlantic Steamship Co.'s new Dock, American News Office, &c., Posey County Court House, Mt. Vernon, Holt County Court, Oregon, Mo. Also to buildings in Boston, Cincinnati, Detroit, Janesville, Wis., Baltimore, Canada, &c. Have been for years in daily use in every principal city throughout Europe, and are indorsed by the **Leading Architects of the World.**

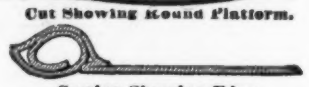
Office and Manufactory,

162 & 164 West 27th Street, N. Y.

ANSONIA CORRUGATED STOVE PLATFORM



Cut Showing Round Platform.



Section Showing Edge.

Manufactured by the

Ansonia Brass & Copper Co.

Office, 19 & 21 Cliff Street, NEW YORK.

The Ansonia Corrugated Stove Platform, with its heavy figured ogee border, is believed to be the best Platform offered to the trade. As shown in the illustrated section herewith it requires no nailing to keep it in place or to prevent it from turning up at the edge; while the metal is of sufficient thickness to require no lining.

The low price, superior quality and fine finish of this Platform will be readily acknowledged. Packed 24 in a case.

Send for price list.

ANSONIA Bronzed Fire Screen,

With Ornamented Mouldings.

PATENT APPLIED FOR.

The Portable Bronzed Fire Screen or Shield, as shown in the illustration, is especially designed for the safety and protection of walls, furniture, woodwork, paper or varnish from heat.

Being constructed of metal, with firm and substantial edges, curved in form to stand alone, it may be easily adjusted to any position about a stove, before a grate or fire place. The demand for something useful, durable and ornamental as a Fire Screen has long been felt, and having finally accomplished the desired result, we are prepared to fill all orders promptly.

BROWN & SHARPE MFG. CO

Providence, R. I.,

MANUFACTURERS OF

MACHINERY & TOOLS.

Gears Cut and Index Plates Made and Drilled to Order.

PATENT CUTTERS FOR THE TEETH OF GEAR WHEELS

can be sharpened by grinding without changing their form. Cutters made on this plan will outlast many of the old form, with the advantage of being always ready for use. If the cutter becomes dull before a wheel is completed, it can be taken out, sharpened and returned to its place in a few moments without risk of altering the form of teeth to be cut. Cutters for milling any irregular form made to order on the same plan. Parties having occasion to use mills for irregular shapes on sewing-machine, gun or other work, will readily see the advantage such cutters possess over those in general use, both as regards economy and convenience. Descriptive circular with price list sent by mail on application.

SABIN MFG. CO.,

MONTPELIER, VT., Manufacturers of

PATENT DOUBLE ACTING SPRING BUTTS,

Sabin's Lever Door Springs

For Heavy Doors.

The BOSS and CROWN SPRINGS for Screen and Light Inside Doors.

General Agents. { HENRY BROOKS & CO., 127 Milk Street, Boston.
E. P. WHIPPLE, 100 Chambers Street, New York.
KELLOGG, JOHNSON & BLISS, 108 Randolph Street, Chicago.

RHODE ISLAND HORSE SHOE CO.,

OFFICE, 81 Canal Street, Providence, R. I. **WORKS at Valley Falls, R. I.**

Manufacturers of

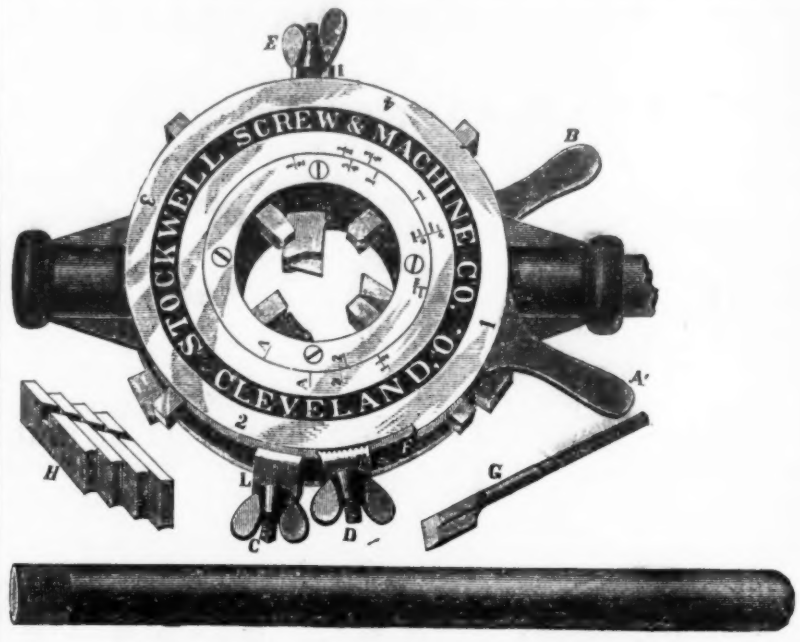
PERKINS and RHODE ISLAND PATTERNS of

HORSE AND MULE SHOES.

The "Magic" Screw Plate.

The Stockwell Screw and Machine Co., Cleveland, Ohio, are manufacturing a new tool for the use of steam and gas fitters, blacksmiths and others who have threads to cut upon bolts, gas pipe and tubing of any kind, which has a great many novel and useful features, and is one of the most complete hand tools that we have recently seen. It will thread bolts, thread and cut off pipe, and by the use of a nipple holder perfect gas nipples can be made with it. The tool is called the "Magic" Screw Plate. Five sizes are made, cutting from ⅛ inch to 4 inches. The smallest size cuts from ⅛ to ¼ inch, and the largest from 2½ to 4 inches. There are also two sizes made without a cut-off, especially adapted to the use of blacksmiths, carriage makers and machinists. These are furnished in a case, with a full set of taps.

The illustration shows what is called the No. 3 plate, and has a range of work from ½ inch to and including 2 inches. The largest size differs only in having four handles instead of two. In the cut, B represents the cam plate by which the dies are operating the guides. The cam plate A operates the dies. I, represents the cutting-off tool, operated by the thumb-nut E. G shows the cutting-off tool removed to show its shape. The stops L and K are used for fastening the cam plates, while C and D are the thumb nuts for clamping the cam plates.



THE "MAGIC" SCREW PLATE, FOR PIPES AND BOLTS.

In threading a pipe, say of 1½ inches in diameter, the cam plate A is turned until 1½ on it is opposite 1½ on the inner circle. The thumb nut C is then screwed up, clamping the plate fast. The pipe is then slipped through the guides, the end resting against the dies. The guides are then thrown in until they touch the pipe and are clamped with the nut D. The tool is then in position to proceed with the cutting. When the thread is cut the dies are thrown back from the pipe and the tool removed. In changing the dies the cam plate is turned until the letter A upon it corresponds with the A upon the inside circle. In cutting off, the guides are firmly set against the pipe and the cutting-off tool brought into action by the feed screw E, setting up lightly at each revolution of the tool. The dies are flat pieces of steel, as shown at H. Among the points which we think especially valuable are these: The adjustable self-centering dies; the ability which the operator has to detach the tool from finished work without running back over the thread; the rapid and accurate centering of the tool without trial; the rapidity with which the dies can be changed; the ease of cutting and the small amount of wear due to form, &c. The range of work is equal to that of many of the machines in the market, while it possesses the advantages of lightness and portability. Taken altogether, we think the tool will prove a very valuable one.

A Bolster Spring for Farm Wagons.

The Semple & Birge Manufacturing Company, St. Louis, Mo., are manufacturing an improved form of bolster spring for farm wagons. It is known as Pulliam's Patent Bolster Spring. Its form is clearly shown in the accompanying illustration. It consists of two C-springs, bolted to the body of the wagon, and having their four ends coupled by a bent leek which hangs over or rests upon the bolster. It is not intended that they shall ever be taken from the body or bed, but go with it when lifted off the gears. The aim in designing this spring is to obtain a form that shall carry a light load easily, and at the same time be strong enough when compressed to carry a heavy load. The form adopted is such that if the spring be overloaded no harm can result, as the body will take a bearing upon the

bolster before the spring is strained beyond its power of easy endurance. Farmers and others having plain box wagons often use them without springs because a convenient and cheap form of spring is not at hand, and also because they do not fully comprehend the great advantages of springs beneath a load. It was found by Mr. Morin, in some experiments made in France, that on a good sand road it took 2.64 times as much force to draw a load without springs as it did with a similar vehicle with springs. In other words, a team could haul almost three times as much when there were springs as they could without. In addition to this there is an immense advantage in prolonging the life of the wagon. The comfort of a spring wagon should by no means be overlooked. The spring is, of course, applicable to farm wagons of all makes, and can be attached by any one without trouble. They can be had of different sizes, so as to be suitable for light or heavy work.

The Enterprise Manufacturing Company of Pennsylvania.

The works of this company, located directly on the line of the North Pennsylvania Railroad, at Third and Dauphin streets, Philadelphia, may be taken as the type of a successful American manufacturing establishment, and as such is worthy of description.

The nucleus from which the present establishment has become an outgrowth was a little 14 by 28 room on Library street, where, in 1865, Mr. Henry Asbury and Mr. John G. Baker began the repair of printing presses and the manufacture of measuring faucets. The growth of the business and the necessity for a foundry caused them to move to the site now occupied, and in September, 1866, they became an incorporated company under their present title. Mr. Asbury is the president; Mr. Jacob R. Smith, treasurer; J. R. Seltzer, secretary, and Mr. L. W. Clare and Mr. Baker complete the company. By well-directed industry and a judicious observance of the real secrets of success, they have built up an extensive and growing trade in patented hardware specialties, and their works now cover an area 266 by 258 feet, extending from Third street on the west to American street on the east, and 266 feet south from Dauphin street. Their latest addition, 114 by 150 feet, has been made since last spring. It includes the new offices just occupied and all the cleaner and less noisy parts of the business. In fact, this classification of the work into departments, and its location in the most suitable parts of the building, is quite a feature of the establishment, and gives an air of system and cleanliness which is striking to the observer.

Entering the new office the effect produced is cheerful, owing to the abundance of light and the handsome plastering on walls and ceiling, the latter relieved by a center-piece and chandelier and a line of gilt molding near the cornice. The woodwork in the wash-board, door frames, panels, &c., is relieved by alternate strips of walnut and chestnut wood, and the floor is laid out in different patterns of colored English tiles. Besides the main office there is a private office, or retiring room, an iron window of which opens on the workmen's exit, and from this window they receive their money as they file by in regular order on pay day. Next to this room is the safe, and then the wash room, all communicating with the main office. On the second floor, reached by an iron staircase, is the drafting room, another well-lighted apartment; next to that a sample room, containing samples of the different goods; then a printing room and the wash rooms, &c. This suit is plastered, tiled and furnished in the same style as the lower floor, and both are separated from the rest of the building by a heavy brick wall; the floors are also arched with brick and strengthened with iron girders, thus rendering the office practically fire-proof, nothing being combustible but the furniture. These rooms and the rest of the addition are warmed by three heaters in the basement, the company having decided that such would be less troublesome and more economical in the long run than an elaborate system of steam pipes.

Leaving the offices, we find in the basement of the new building a stock room of the different small castings, from which an order can be filled at short notice. On the ground floor is the shipping room, where the finished goods are packed and shipped to any point. On the second floor is the tinning department and stock room for coffee mills, savings banks, &c. On the third is the wood-working machinery. Here the handles for the polishing and smoothing irons are made by special machinery, designed and patented by the company. A double crown saw cuts semicircular strips from a piece of board, these are glued in the form of rings, and made round and true in a few seconds by revolving cutters in another special machine, after which they are coated with shellac and sawed apart again ready for use. This process, though apparently so simple, has been the means of effecting a great saving in the cost of manufacture. All these floors can transfer their wares by means of a Sellers hoist and ele-

RUSSELL & ERWIN MANUFACTURING COMPANY

Manufacturers of HARDWARE.

FACTORIES, - - - - NEW BRITAIN, CONNECTICUT, U. S. A.

MANUFACTURERS' AGENTS AND DEALERS IN GENERAL HARDWARE AT OUR

WAREHOUSES: NEW YORK, 45 & 47 Chambers Street; PHILADELPHIA, 425 Market Street; BALTIMORE, MD., WM. H. COLE, Agent, 17 South Charles Street.

AT THE EXPOSITION UNIVERSELLE, PARIS, 1878,

The RUSSELL & ERWIN MFG. CO., of New Britain, Conn.,

Obtained the **Five** Highest Awards for their lines of goods in Five different classes, viz.:

A GOLD MEDAL

In Class 66

For Fine Secure Door and Pad Locks and Artistic Fittings for Architectural Decoration.

A GOLD MEDAL

In Class 43

For General Hardware, Tools, Etc.

A BRONZE MEDAL

In Class 11

For Designs for the Ornamentation of Door, Window and Fire-Place Decoration.

A BRONZE MEDAL

In Class 25

For Art Castings.

AN HONORABLE MENTION

For their display of Mechanics' Tools, Class 59 (Douglass Mfg. Co.'s Goods).

In Classes Nos. 11, 25, 59 and 66 they received higher awards than any other firm in their line of business.

In Class No. 43 there were only three other exhibitors who received the same prize.

In Class No. 66 they received the only Gold Medal given for Bronze Goods or Fine Locks, and are the only firm in the Hardware line that received **two** Gold Medals, and out of only three awards to the United States exhibitors for Art Work they received **two.**

Cutlery.

FRIEDMANN & LAUTERJUNG,

Manufacturers of **PEN AND POCKET CUTLERY.**

Solid Steel Scissors, Shears, Razors, Russia Leather Strops, Hones, &c.

Sole proprietors of the renowned full concave patent

"ELECTRIC RAZORS,"

And the celebrated **"ELECTRIC SHEARS."** Nickel Plated Bows.

Agents for the BENGALL RAZORS.

AMERICAN TABLE CUTLERY BUTCHER KNIVES, &c.

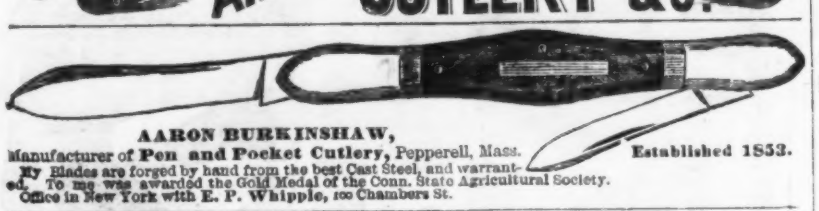
91 Chambers and 73 Reade Sts., N. Y. 423 N. Fifth St., ST. LOUIS, MO.

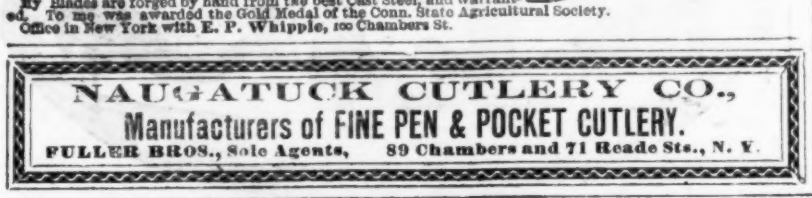
MERIDEN CUTLERY COMPANY.

The oldest manufacturers of Table Cutlery in America. Exclusive makers of the CELLULOID HANDLE for Table Cutlery. A most beautiful and perfect substitute for Ivory. Also makers of all kinds of TABLE, BUTCHER AND HUNTING KNIVES. Illustrated catalogues with prices sent to the trade on application.

No. 49 Chambers Street, New York.

THE LAMSON & GOODNOW MFG. CO. 88 CHAMBERS ST. N.Y. AMERICAN TABLE CUTLERY &c.





AARON BURKINSHAW,

Manufacturer of **Pen and Pocket Cutlery,** Pepperell, Mass. Established 1833.

My Blades are forged by hand from the best Cast Steel, and warranted. To me was awarded the Gold Medal of the Conn. State Agricultural Society.

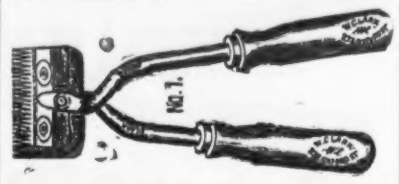
Office in New York with E. P. Whipple, 100 Chambers St.

NAUGATUCK CUTLERY CO.,

Manufacturers of FINE PEN & POCKET CUTLERY.

FULLER BROS., Sole Agents, 89 Chambers and 71 Reade Sts., N. Y.

Cutlery.



McCoy & Co.,

134 & 136 Duane Street, New York,

SOLE WHOLESALE AGENTS

CLARK'S

PATENT HORSE CLIPPER

Five styles. Fully described by our circular and price list, which we will send on application.

The genuine are stamped on both the wooden and metal parts, as shown in the illustration, as a protection against inferior imitations.

All repairs executed with care and dispatch.

Cutlery.

JOSEPH S. FISHER,

No. 411 Commerce St., PHILADELPHIA

AGENT FOR

George Wostenholm & Son, "Limited."

Washington Works, SHEFFIELD,

Celebrated I-XL Cutlery, Razors, &c

AGENT FOR

WALTER SPENCER & CO.,

Steel and File Manufacturers,

Rotherham, ENGLAND.

Corporate Mark.

Granted 1777.

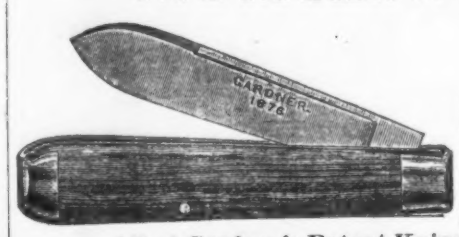
HERMANN BOKER & CO.,

101 & 103 Duane Street, New York,

SOLE AGENTS FOR THE

GARDNER PATENT

POCKET KNIVES



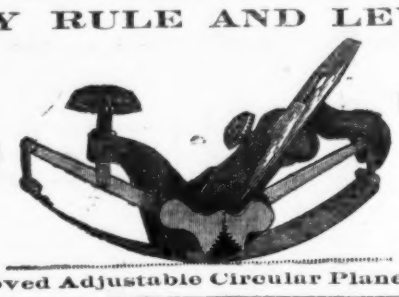
The assortment of Gardner's Celebrated Barlow Knives has been increased, and they are now furnished with Rubber, Bone, Stag and Wrought Iron Handles.

All of Gardner's Patent Knives are fully warranted.

STANLEY RULE AND LEVEL CO.,

MANUFACTURERS OF

Improved Carpenters' Tools.



FACTORIES,

New Britain, Conn.

WAREROOMS,

29 Chambers St., New York.

No. 113, Improved Adjustable Circular Plane - - $4.00

HALL, ELTON & CO.,

Electro Plated Ware, German Silver and Britannia Spoons.

THE "REGENT."

(Patented.)

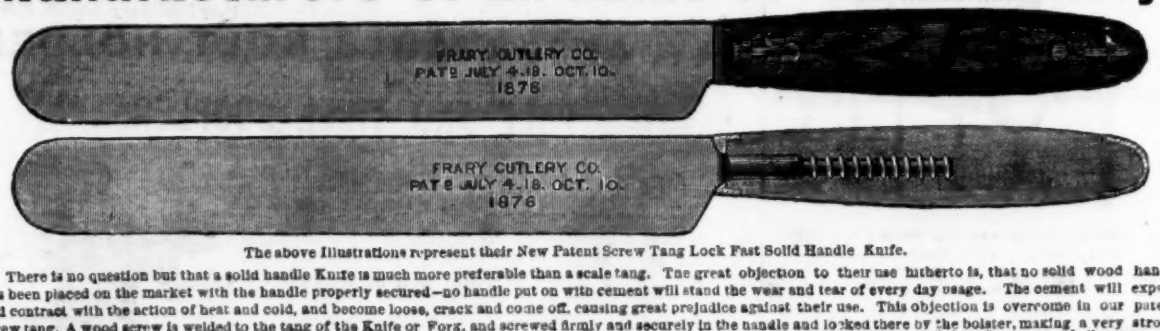
Factories, Wallingford, Conn. **Salesroom, 75 Chambers Street, New York.**

THE FRARY CUTLERY COMPANY,

FACTORY, BRIDGEPORT, CONN.

NEW YORK OFFICE & WAREHOUSE, with WIEBUSCH & HILGER HARDWARE CO., 84 Chambers St.

Manufacturers of all kinds of Table Cutlery.



The above Illustrations represent their New Patent Screw Tang Lock Fast Solid Handle Knife.

There is no question but that a solid handle Knife is much more preferable than a scale tang. The great objection to their use hitherto is, that no solid wood handle has been placed on the market with the handle properly secured—no handle put on with cement will stand the wear and tear of every day usage. The cement will expand and contract with the action of heat and cold, and become loose, crack and come off, causing great prejudice against their use. This objection is overcome in our patent screw tang. A wood screw is welded to the tang of the Knife or Fork, and screwed firmly and securely in the handle and locked there by the bolster, making a very strong neat and handsome knife, which we warrant never to get loose, crack or come off. We manufacture a large variety of patterns, both Table, Butchers and Carvers, and furnish the patent handle nearly as low as the scale tang. We are prepared to furnish this line of goods, together with the scale tang and iron handle, very promptly, and very respectfully invite the attention of the trade.

MALTBY, CURTISS & CO., No. 34 Reade St., N. Y.,

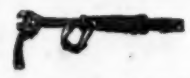
HARDWARE MANUFACTURERS AND MANUFACTURERS' AGENTS.

Sole Agents for the

NORWICH PISTOL CO.

Send for circular and price list.

Tin Key Faucet.



Capewell's Giant Nail Puller.

SUPERIOR QUALITY

MALLEABLE IRON.

IVES, WOODRUFF & CO.,

MT. CARMEL, CONN.

TACKLE BLOCKS.

Rope and Iron Strap of all kinds. Lignumvitæ Wood for Ten-Pin Balls.

Wm. H. McMillan & Bro.,

Office, 113 South Street, New York.

Factory, 39 to 49 Penn St., Brooklyn, E. D.

E. E. GARVIN & CO.,

Manufacturers of

Milling Machines, Drill Presses,

Hand Lathes, Tapping Machines, Cutter Grinders and Wood Planers. Milling Cutters all shapes and sizes. Gear Cutting and Milling in all its branches.

139-143 CENTRE STREET,

Cornell's Building, NEW YORK.

☞ Send for Illustrated Catalogue.

CORPORATE MARK,

Joseph Rodgers & Sons'

(LIMITED)

CELEBRATED CUTLERY,

No. 82 Chambers Street, New York.

F. & W. CLATWORTHY, Agents.

The demand for **Joseph Rodgers & Sons'** productions having considerably increased, they have, in order to meet it, greatly extended their Manufacturing Premises and Steam power.

To distinguish Articles of **Joseph Rodgers & Sons'** Manufacture, please to see that they bear their Corporate Mark.

PATENT MINERAL WOOL.

Entirely Fire Proof, Undecaying, and the Best Non-Conductor of Heat, Cold and Sound.

Used extensively for lining steam pipes and boilers, underground and open air pipes, water tanks, refrigerators, cold storage houses, roofs and walls of dwellings, drying kilns, deadening floors of railway passenger cars, &c.

ALEXANDER D. ELBERS,

No. 96½ Broadway, New York

Address P. O. Box 4461.

I. R. SPENCER & SON,

Albion Steel Works, Sheffield

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c., of every description.

CORPORATE MARK.

Granted 1749.

Young's Patent Folding Scissors.

Having largely increased our facilities for the manufacture of these very popular goods, we offer them to the trade at a large reduction from our former prices. The list price of the large size is now $12.00 per dozen, formerly $18.00, and the small size, $9.00, formerly $12.00. The material used in the manufacture of **Young's Patent Folding Scissors** is the very best. All are nickel-plated and furnished with a neat morocco case.

MARX BROS. Proprietors,

430 Broadway, New York.

SYRACUSE CUTLERY COMPANY,

Manufacturers of

Pen and Pocket Knives,

Warranted made from

S. & C. WARDLOW'S EXTRA CAST STEEL.

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Importer of **CHAINS, ANVILS, VISES, &c.**

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HILL BROTHERS & CO., WALSALL, ENGLAND,

GENERAL HARDWARE MERCHANTS,

And of

BALL'S PAT. SOLID STEEL SHEEP SHEARS.

These shears are unsurpassed for cheapness, durability and utility. They are made of one solid piece of steel from point to point, and cannot be broken in use either in the bow or at the junction of the shank and blade. Samples can be seen at above address, or sample lots furnished.

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Agent for CLEMENT & MAYNARD'S Trowels, Hoes, Shovels, Spades and Scoops. Their Trowels and Hoes have entirely supplanted the English by their quality and cheapness, while all their goods compare advantageously with those of other makers and are largely exported.

vator platform, and are also supplied with water buckets, fire extinguishers, axes and other means of combating fire. The different parts of the establishment communicate with the office by speaking tubes. The addition is separated from the old building by a small street, consequently the second floors are connected by the covered bridge so frequently used of late.

In the basement of the old building are the large grindstones, fitted up with special machinery for grinding the face and sides of the smoothing irons, the stones having a lateral travel to give the surface true and even wear. The machine shops occupy most of the ground, second and third floors, and are supplied with power by two Wilbraham engines, the one 50, the other 40 horse-power. Two 70-horse boilers are used, and are fed by steam pumps controlled by the Berryman feed water regulator, by means of which the water level in the boiler is not allowed to vary more than half an inch. The boilers are also furnished with the low-water alarm and all the modern safety appliances.

In the machine shops, again, the use of special tools is still further noticeable—combined multiple drilling machines upon a single frame made by the company; lathes with long carriage bearings for accuracy and durability; tapping machines which run with great rapidity, automatically stopping and reversing the feed on the instant, making quick work while it avoids stripping the thread, are but a few of the means taken to develop celerity and economy of production. In one corner of the third floor is the electro-plating room for nickel plating the irons. The electricity for this purpose is developed by a Weston dynamo-electric machine, and the plating process now requires but an hour and a half where it formerly took almost a half day. There is also a japanning room on both second and third floors where the different goods are handsomely japanned, and then baked in the ovens to give them a handsome and durable finish. The heat in the ovens is furnished by steam pipes, which run up the back of the same and under the open ironwork flooring. Adjacent to these are the polishers, who give the last touches to the nickel-plated irons, rubbing them on muslin wheels, which, though loose and shapeless when idle, become compact and firm when in a state of rapid revolution. Below these on the ground floor are the old offices, now deserted except by the time clerk, and close by them is a pattern room in which the small metal patterns are kept. This room and contents are also considered fire-proof.

Leaving here and approaching the foundry, we first encounter the churns in which those castings, not easily broken, are cleaned of sand and grit. The churns are driven much like a shuttle carriage; there is one long driving shaft, and parallel with it is a short idler shaft for each churn. These idlers, as well as the driving shaft, carry small rollers at their extremities on which the churns rest, and are revolving by the friction of contact, though by means of hooks any churn can be pulled out, emptied, refilled and rolled back again without further manipulation and without stopping the rest of the machinery. The foundry is built in somewhat of an L shape, with one wing running out to the railroad, from which cars carrying coal, pig iron and molding sand can be run directly to the place where used. The foundry is furnished with two cupolas. The larger is devoted exclusively to melting pure No. 1 pig, and gives the company facilities for turning out soft castings when demanded; in the other, scrap is melted as well, and gives a harder casting, such as used in the smoothing irons. Along with the foundry is the core room, where the cores are made, and afterward stored in a room above, and sent down by a small elevator when needed.

Back of the foundry are the pickling rooms for cleaning delicate castings, another wood pattern room, the stable and a prospective brass foundry. Within the inclosure of these buildings is the smith's shop, another clean and light apartment, where repairs and such forging as is necessary is done. Running along Third street from the addition is the lumber shed, and back of this is an open space where the company can further extend their works if necessary. In fact, arrangements were made when putting up the new building that it might be extended with the least inconvenience.

The company is devoted exclusively to the manufacture of patented hardware specialties, among which may be enumerated the following: The cold-handle polishing and smoothing irons in all sizes; improved coffee, spice and drug mills; patent suction and force measuring faucets; self-weighing cheese knife and safe; champion tobacco, herb and root cutter; bunghole borer or hollow auger; combined sausage stuffer, fruit, lard and jelly press; dried beef cutter, money banks, &c. These goods are all well known, and their excellence is attested by increasing orders from year to year.

The works turned out last year goods to the amount of $320,000, and with the addition have a producing capacity of $500,000 per annum. They employ over 300 men at present, and have an average consumption of 8 tons of iron per day.

Change in Freight Rates on Iron from Pittsburgh East.—We are informed by the freight agent of the Pennsylvania Railroad that from and after the 28th inst. until further notice the rates on iron, in car loads or less, over the Pennsylvania Railroad will be as follows:

Pittsburgh to Baltimore	18c.
" " Philadelphia	19c.
" " New York	21c.
" " Boston and Providence	26c.

As will be seen by the foregoing statement, these rates apply to iron only, and reduce the figures to the same charges as those which existed for some time previous to the recent advance. Other fourth-class freight will be charged at the advanced rates recently announced.

M. Tkindt, manager, and M. Fortamps, president of the Banque de Belgique, who defrauded the bank of $400,000, were convicted in Brussels on Tuesday last and sentenced, the former to fifteen years solitary confinement, and the latter to one year's imprisonment, with $1200 fine.

S. H. & E. Y. MOORE,

168 Lake Street, CHICAGO, ILL.,

Heavy Hardware & Railway Supplies.

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Nos. 6, 7, 8, 9 and 10, for using plain.
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Combines Strenght, Durability, Beauty. | It is Graceful, Noiseless, Light and Easy.

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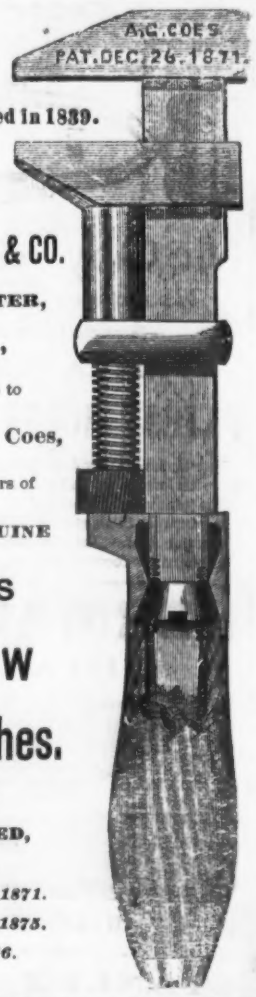

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The strongest Wrench made, and the only successful Re-enforced Bar.

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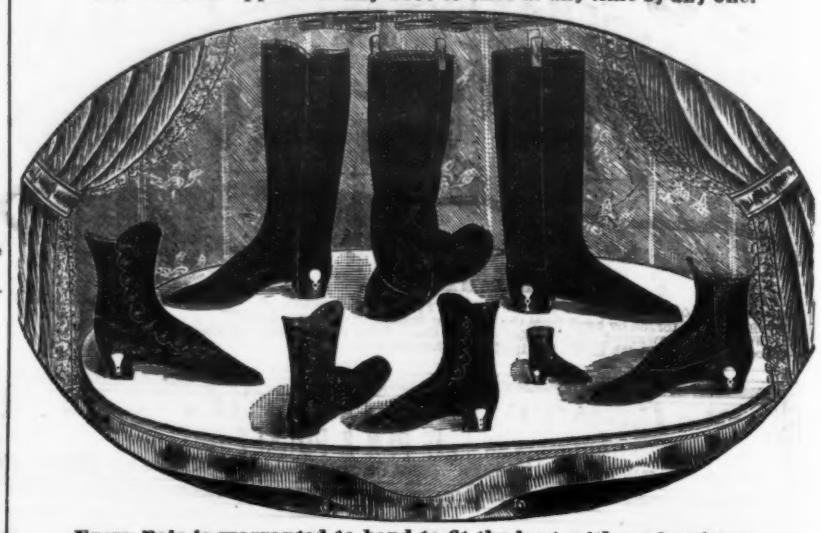
Old Boots and Shoes can be Straightened and New Ones kept Straight by using

Lyon's Patent Metallic Heel Stiffener.

These can be applied to any boot or shoe at any time by any one.



Every Pair is warranted to bend to fit the boot without breaking.

For 1¾ Inch Heel. For 2½ Inch Heel.

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I will also call attention of Carriage Makers, Blacksmiths and Livery Men to my

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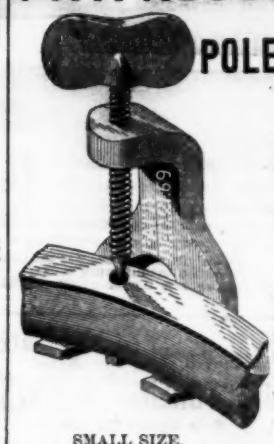
POLE AND THILL COUPLER.



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For Tire and other Bolts.

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Adjustable for putting Rubbers in Pole and Th Couplings, and holding Tire and other Bolts.

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Combined Snow Shovel and Ice Pick.

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BEST QUALITY CARRIAGE MAKERS' HARDWARE.

Manufacture the Largest Variety of Forged Carriage Irons of Best Material and Workmanship.

PRICES LOW FOR QUALITY OF WORK FURNISHED.

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Polished or Blued Horse Nails, Hammered and Finished.

The Saranac Nails are hammered hot and the finishing and pointing are done cold. Quality is fully guaranteed. For sale by all leading iron and hardware houses.

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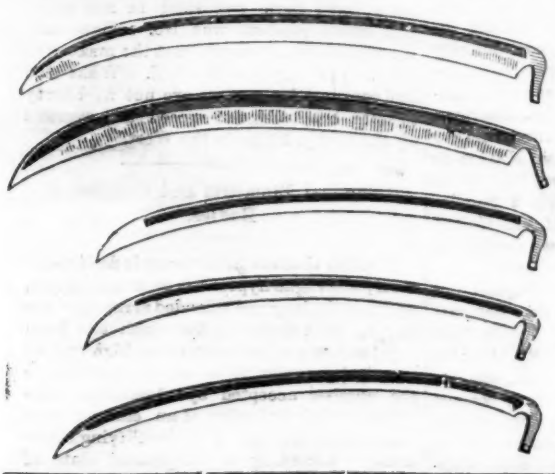

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Communications by letter will receive prompt attention.

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This Wrench can be furnished with Briggs' Pat. Nut or Sleeve.

PATENT COMBINATION WRENCH.

These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, case-hardened throughout, and not only combine all of the superior qualities of our Cylinder or Gas Pipe Wrenches, but also all requisite Combinations of a regular Nut Wrench, thus making a combination which has no equal

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SPECIAL NOTICE.

The undersigned, in view of the **Paris Exhibition** of 1878, begs to inform his friends that he continues to make translations of Catalogues, Prices-current, Circulars, Correspondence, &c., from and into the

ENGLISH,
FRENCH,
GERMAN
and **SPANISH,**

and that he bestows special attention upon a strictly correct rendering of **Technical Expressions** in matters relating to **Machinery, Metallurgy, Hydraulics,** &c. The very best reference will be furnished from leading manufacturers in this city, Philadelphia and elsewhere, for whom he has translated. If desired, estimates will be procured for the setting up, electrotyping and printing of catalogues, &c., in the above languages.

C. KIRCHHOFF,
Metal Reporter of The Iron Age,
83 Reade St., New York.

The Iron Age.

AND

Metallurgical Review.

New York, Thursday, December 5, 1878.

DAVID WILLIAMS - - *Publisher and Proprietor.*
JAMES C. BAYLES - - *Editor.*
JOHN S. KING - - - - *Business Manager.*

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One square (12 lines, one inch), one insertion, $2.50; one month, $7.50; three months, $15.00; six months, $30.00 one year, $40.00; yable in advance.

DAVID WILLIAMS, Publisher,
83 Reade Street, New York.

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JOS. D. WEEKS, Manager and Associate Editor.

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BRITISH AGENCY.

The publishers of *The Ironmonger*, 442 Cannon street London, England, will receive orders for subscriptions and advertisements on our regular terms.

AUSTRALIAN AGENCY.

The American Hardware Company, Melbourne, are our agents for Australia. Sample copies will be supplied by them, free of charge, to any firm engaged in the trades we represent in Australia, Tasmania and New Zealand.

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Forty-first Page.—Boston and St. Louis Hardware and Metal Prices.

Even the thrifty Swiss are suffering from the effects of building more railroads than they needed. The current market value of the securities of eighteen companies, representing about $215,000,000 of capital actually expended, is said to be only $115,000,000. Their gross earnings in 1876 were at the rate of $8250 per mile, which is more than the average in this country (about $6016 in gold), but the cost of the Swiss roads was about $214,000 per mile, against $61,000 for the American.

The French Drawback System.

The history of the French drawback system is one of the most curious and amusing which can engage the attention of the student of political economy. As the facts will probably be new to many of our readers, we have taken care to collect them from trustworthy sources.

During the period of the Restoration the foreign trade of France declined to almost nothing, owing in great degree to a tariff so injudiciously framed as to oppress industry without protecting it. To encourage both imports and exports recourse was had to a series of experiments with various systems of drawbacks, or *acquits à caution*. At first it was thought sufficient to aid exports, and accordingly exporters were granted from 1822 to 1826 a release of duty on any articles manufactured from foreign materials. It was not necessary at the time to import corresponding amounts. This was placing those manufacturers who did not export at a disadvantage, and it is not surprising that in 1833 quite a different policy was adopted—that of issuing drawback certificates, or *titres d'acquits à caution*. Anybody could import raw materials if he promised to export a corresponding amount of goods, the export being limited to those articles actually manufactured from imported raw material. It was soon found that this principle of insisting upon the identity of the material could not be carried out without government supervision. At first the want of proof of identity of the imported raw material and the exported manufactured articles was in exceptional cases connived at; in 1850 it was openly permitted, and finally, in 1856, the exportation of an equivalent was officially sanctioned. The importer did not need to prove that the imported material had been actually used in the manufacture of the finished exported wares. Thus, Scotch pig might be imported into Havre and used for foundry purposes, while rails made of French pig were exported from Marseilles, thus saving the entire cost of transportation from Havre to Marseilles. The French system possessed another peculiar feature. As late as 1856 an allowance was made for waste, and a certain percentage of the raw material was entered free to make up for waste in the processes of manufacture. For instance, 110 tons of pig imported were deemed an equivalent for 100 tons of bar exported. These allowances were extremely liberal, far beyond the actual waste, and they were in a measure the cause of the sudden collapse of the system. It was urged by manufacturers, as well as by exporters, that importers were given the benefit of a double premium injurious to domestic industry. Importers sold the imported goods in competition with those produced by home manufacturers, and placed the *titres d'acquits à caution* with the exporters at prices which, with the commissions of middle men, left little difference between the duty and the price of the drawback certificates. The greater the amount of work put into goods the smaller the saving to the exporter, while the demand for *titres* on products which required little additional work, such as unfinished castings, was great and forced the price of the drawback certificates up. This favored the importer almost exclusively, until in 1857 the laws were so changed that the exporter was chiefly benefited. Exporters alone had the right to obtain *titres d'acquits à caution*, and at the same time it was provided that the quantities exported were to be equal to those imported, as it was deemed impossible to determine exactly the amount of waste in manufacture. It was not, however, necessary to prove identity.

In 1862 a decree dated February 16, now partially in force, provided that pig iron, scrap, bar, hoop iron, various shapes and sheet could only be imported free of duty upon the petition of exporters who were ironmasters, machinists or metal workers. They were to prove either special orders from foreign customers or regular export. Drawback certificates were placed at the disposal of exporters, in order to enable them to import the raw material for the manufacture of the goods to be exported, but identity was not specially insisted upon. Thus, telegraph wire was exported, and in place of it double T iron was imported, ostensibly as a raw material for its manufacture, in the face of the fact, well-known to every metallurgist, that wire is never made of double T iron. This called for stricter measures, and accordingly additional limitations were enacted in 1868, by which a register of the articles to be exported had to be filed by the exporter before he could obtain *titres d'acquits à caution* for importing his raw materials free of duty. But even this was not sufficient, so that on the 9th of January, 1870, a law was enacted which required clear proof of identity of imported material and exported product, with the exception of pig iron, and even in that case it was limited to the export of castings for gray foundry pig, and of charcoal-iron goods for charcoal pig. As the drawback is paid on an amount of imported material equal to the exported goods, the *titres d'acquits à caution* are not worth the whole amount of the duty, but are at a discount equal to the percentage of waste of material in manufacture. The French manufacturer, therefore, pays a duty on his raw materials which amounts to the discount above mentioned plus the cost of transportation, to which must be added, in case the manufacturer does not himself import, the middle man's commission and the importer's profit. Those who export are the large manufacturers who are in a position to take orders abroad. For them import is of minor consequence, and therefore they sell their *titres d'acquits à caution*. As regards pig iron the actual state of affairs is as follows: The only ones who really import and export are ironmasters on the Belgian frontier. In the north and northeast of France, Scotch foundry pig and German mill pig is imported, while the chief exporters are in the central and the southern districts, sending their product out of Marseilles mainly. It might appear as though this arrangement benefits chiefly the exporters while it acts injuriously upon the country at large, but the reverse is said to be true, as, besides the saving in transportation, the exporters have no interest in placing their product upon the home market in competition with home manufacturers, since they sell at home at the same prices but market their products at a lower rate abroad. The following table shows the French imports and exports of pig iron in thousands of metric tons:

	A	B	C
1870	27	20	122
1871	70	39	45
1872	72	49	92
1873	81	51	96
1874	100	32	98
1875	97	63	91
1876	99	84	126
1877	93	122	105

In the table the column A represents the total import of pig iron under *acquits;* B, the total import paying duty; C, the total exports of iron products under *acquits* from 1870 to 1877 inclusive.

Mexican Trade.

Whenever Mexico is politically quiet our business with that country immediately experiences a healthy development. This has again been the case during the past few years to such an extent that, of the various countries in tropical America to which we ship domestic produce, Mexico now occupies the fourth rank, Cuba being the most important, Brazil the next, followed by the British West Indies and Mexico. The amount of American goods consumed in Mexico is assumed by all those familiar with trade in that country to be even more considerable than the official statistics can show, for it is notorious that large quantities are smuggled across the Texan frontier and in other localities. This has been the case, it would seem, to a greater extent of late than at any previous time.

According to American statistics our trade with the neighboring republic has developed as follows during the fiscal years 1864 to 1878. The amounts are stated in thousands of dollars:

	Imports from Mexico.	Exports to Mexico. Domestic Goods.	Foreign Goods.	Totals.
1864	7,884	10,928	1,754	20,566
1865	8,656	16,111	3,344	28,111
1866	4,844	3,717	872	9,433
1867	3,921	4,862	590	9,373
1868	6,116	5,061	1,393	12,570
1869	7,232	3,837	1,047	12,116
1870	13,099	4,556	1,319	18,974
1871	17,511	5,083	2,568	25,162
1872	8,507	3,446	2,133	14,086
1873	16,430	4,085	2,345	22,860
1874	13,239	4,074	1,931	19,244
1875	11,635	3,896	1,875	17,406
1876	12,506	4,707	1,502	18,714
1877	15,443	4,509	1,390	21,344
1878	13,046	5,844	1,649	21,139

Recapitulation.

Total imports from Mexico		160,671
Total exp'ts to Mexico	Domestic goods	84,716
	Foreign "	25,711
Total		271,098

The latest complete official statistics of Mexican trade go no further than the year 1873, but they will answer the purpose of showing the proportion of the various countries, stated in thousands of dollars:

	Import.	Export.
United Kingdom	10,181	12,480
United States	7,420	11,367
France	4,817	4,604
Germany	3,890	803
Colombia	1,233	1,579
Cuba	1,394	733
Central America	105	87
Other countries	22	24
Total	29,062	31,691

	General Import.	From United States.
Cotton goods	10,532	2,120
Linen and hemp fabrics	1,453	185
Woolens	1,428	226
Silks	389	71
Mixed goods	1,417	187
Total	15,419	2,789
Fancy goods	5,122	1,387
China and glassware	578	45
Hardware	2,184	626
Drugs	300	160
Other goods	5,389	2,413
Total	29,062	7,420

EXPORT.

Silver	24,115	Coffee	533
Gold	938	Vanilla	414
Ores	223	Seeds	277
Other metals	98	Cattle	210
Pearls	109	Tobacco	133
Hides	1,547	Orchilla	128
Sisal hemp	1,049	India rubber	93
Dye and cabinet woods	1,043		

Adding $781,000 other goods, we have an aggregate of $31,691,000, 80 per cent. of which has been silver coin and bars.

The total import in 1876 was $28,485,000, and the export $25,435,000, of which $15,000,000 was silver coin and bars.

During the period between 1870 and 1874, both included, England's and our trade with Mexico stood as follows:

	1870–74 England's trade.	1870–74 United States trade.
Export to Mexico	$20,392,205	$31,540,000
Import from Mexico	19,934,270	68,786,000
Total	$40,326,475	$100,326,000

These latter figures show how important our trade with Mexico is in comparison with England, by reason of our proximity. The Mexicans are anxious that their trade with us should become still more important, and as this wish is shared on this side of the Rio Grande, great efforts are now making on both sides to stimulate our intercourse. President Diaz is doing his utmost to that effect; also Mr. Romero, his Minister of Finance, and Mr. Zamacona, the Mexican Minister at Washington.

Among the American cities where this purpose is followed up with the greatest vigor at present, Chicago stands prominent, and a number of merchants are about to start from there to Mexico with this end in view. Important results are sure to be reached in the near future, provided Mexico remains undisturbed by fresh political upheavals. It is to be hoped that the plan of prolonging the term of President Diaz may be carried out, since he seems to fill his difficult office creditably, and an election may lead to renewed political troubles.

The following are the principal domestic articles shipped from the United States to Mexico for the fiscal years 1876 and 1877:

	1876.	1877.
Agricultural implements	$18,243	$26,417
Mules and other live animals	177,449	200,638
Biscuit	10,932	14,447
Flour	198,002	88,897
Clocks	9,441	7,146
Coal	13,785	4,769
Cotton	890,574	462,902
" goods	373,459	1,064,097
Drugs	100,228	71,986
Cordage	8,960	12,895
Hardware	295,812	266,659
Leather goods	89,831	67,616
Petroleum	171,348	221,894
Provisions	79,311	77,927
Sewing machines	75,577	115,970
Refined sugar	36,561	55,690
Tobacco	106,715	131,491
Lumber	126,303	85,298
Woodenware	97,955	26,815
Total	$2,889,546	$3,023,554

The increase in our export of cotton goods will be noted.

It will next be of interest to examine through which custom houses Mexican imports and exports were dispatched in 1873:

	Import.	Export.
Vera Cruz	$14,124,000	$17,939,000
Tampico	2,163,000	2,924,000
Other Atlantic ports	5,065,000	3,082,000
Mazatlan	3,794,000	2,726,000
Other Pacific ports	4,132,000	4,189,000
Frontier	794,000	851,000
Total	$29,062,000	$31,691,000

From this it appears that out of a total trade of $60,753,000, Vera Cruz alone absorbed $32,053,000, or 52 per cent. The aggregate tonnage which arrived in 1873 was 1,000,000, and the number of vessels and flags was as follows:

Mexican	2,227	Norwegian	48
American	332	Danish	33
British	162	Dutch	19
French	115	Other flags	26
German	119		
Spanish	64	Total	3,131

The Mexican merchant navy consists of 357 sea-going vessels and 672 coasting craft.

Great railroad projects are on foot in addition to the lines built and building. The roads in operation may be summed up as follows: Vera Cruz—Mexico, 263 miles; Zamorana—Medellin, 10 miles; Apizaco—Puebla, 29; Mexico—Tlatnepantla, 16; Vera Cruz—Jalapa, 43; Merida—Progreso (Yucatan), 7; together, 368 miles. The great desideratum to be attained within the next decade will be a line to connect the city of Mexico with Acapulco on the Pacific, which at all seasons of the year would make this Mexican transit the favorite thoroughfare for travelers and mails between the two oceans, pending the eventual cutting of the Central American Ship Canal.

Considering the Alpine character of the Mexican highlands before the great plateau is reached, and the enormous engineering difficulties that have had to be overcome, the continual revolutions and the shyness of capitalists in investing their money in public improvements in such a country, it must be confessed that much has been accomplished. About the year 1850 the first few miles of Mexican railroad were built near Vera Cruz, but revolutions and the lack of capital stopped all work until the advent of Maximilian. During his short reign not much was done, civil war absorbing all available funds. Since then great activity has been displayed, and still greater energy will be developed if peace can be maintained. The Mexican and the American railway systems will soon be united, and we shall do as large a business with Mexico as we are now doing with Cuba, for it must not be forgotten that Mexico has a population of 9,276,079. Outside of the United States Mexico is the richest country in America. There is hardly a mineral or agricultural product within the tropical and temperate zones which Mexico does not possess of unexcelled quality. Various old abandoned silver mines, untouched for 60 years past, are being worked again, and are proving small bonanzas. They may become large ones as soon as modern deep mining can be applied. But this requires capital and enterprise, and neither can exist without stability of political institutions and internal peace.

Telegraph lines are plentiful in Mexico. They are of three different classes—federal, State and private. Early last year the following were in operation: Federal, 4424 miles, with 129 offices; State, 922 miles, with 40 offices, and private, 1906, with 83 offices; together, 7252 miles, with 252 offices. Of post offices there are 855, and the number of letters annually distributed exceeds a million and a half. Geographically Mexico has the most enviable position in the New World—a position which, with the innumerable other material advantages the country possesses, invites trade and settlement, and Mexico stands ready to be conquered by us commercially and industrially.

Mine Accidents and their Causes.

One of those coal mine horrors which are fortunately so rare in the bituminous mines of this country, occurred in the mines of Handford Bros., at Sullivan, Ind., on the afternoon of the 21st ult. The coal in this section of Indiana is quite rich in gaseous matter, and the mining is done by shafts, instead of drifts, as in the Pittsburgh region. In this mine two veins were worked, one at the depth of 201 feet and the other 246 feet. The explosion occurred in the lower vein. Two entries or rooms were being excavated toward each other. It was discovered that gas had accumulated in the roof of one, and the miners in the other had been warned that they were nearly through and that any more blasting might go through and fire the gas in the other entry. They were further directed to fan the gas out before connecting the two openings. One of the men, however, took the risk of firing one more blast. The thin wall was broken, and the accumulated gas exploded. Seven men were killed or suffocated as the result of this criminal temerity. Some method should be devised to prevent reckless men from taking risks which peril their own and others' lives. The reports of the mine inspectors of the different States where such officers exist, show a frightful record of accidents and deaths in connection with coal mining, and ghastly tables have been compiled showing how many tons of coal on an average are mined to one death, and how many to each injury to person. The number of tons to each widow and each orphan are calculated in the same way. It is assumed that these are the necessary risks of coal mining, but from investigation and inquiry, extending through some years, we are convinced that a large proportion of these casualties arise from the criminal carelessness or negligence of the miners themselves, and are not necessary in any sense. A naked lamp is used, a ventilating door is shut, a door leading to a passage rich in gas is left open or a shot is fired after warning. Miners themselves should see to it that these risks are not taken. They have beseiged legislatures, and very properly too, asking for mine inspection and laws to protect them against accidents. Now let them protect themselves against causes of danger within their own control. Laws will be of little avail unless the miners shall themselves see to their enforcement.

The Lucy Product.

We are in receipt of the following letter in regard to an item recently published by us:

IRONTON, Ohio, Nov. 14, 1878.

To the Editor of The Iron Age: In your issue of Nov. 7, 1878, you say: "The largest output of Lucy No. 2, at Pittsburgh, was 820 tons of Bessemer pig in one week." As some of the previous reports, made by officers of the Lucy Furnace Company, have been in net tons, we would very much like to know whether the above was net or gross; also the grades of Bessemer pig made and the amount of fuel used, as we are much of the opinion that if the Lucy Furnaces are not running at an expense of fuel some of our furnaces are not working up to the standard.

A MEMBER OF THE IRONTON SCIENTIFIC SOCIETY.

In answer to this we would say in the first place that the output of the furnace for the week ending Oct. 20, was 823 1986-2268 tons instead of 820. In the second place we are not aware of any reports having been made "by officers of the Lucy Furnace Co." So far as we recall now, the first publication of the workings of the Lucy Furnaces have generally been made through our columns. The owners of the Lucy Furnaces have invariably expressed a disinclination to publish these facts, and it has only been as the result of persistent urging and for the benefit of the trade that permission has been given. The tons are 2268 lbs. Will our correspondent point out when reports have been published in net tons? The entire product was No. 1 Bessemer. We repeat our statement, that the make was not at the expense of fuel. What the fuel consumption was we are not at liberty to state, but it did not exceed the average of the best practice in the West.

Chemical Elements and Compound Bodies.

It seems that modern science is destined to verify the vague hypothesis of Robert Boyle, and that the long and splended array of "elements," each accession to which has been regarded as a milestone on the highway of chemical progress, is to shrink perhaps to the number accepted by Aristotle. The time-honored definition of an element was wisely supplemented by the qualifying statement, "according to the present state of science," and if the startling announcement now made by Prof. Lockyer be true, this reservation was necessary. At the session of the French Academy of Sciences on Nov. 12, the venerable Dumas communicated to the scientific world the great tidings that Prof. J. Norman Lockyer, the well-known English astronomer, has demonstrated with the aid of the spectroscope that many, if not all, the so-called "elements" of chemistry are compounds. The *Chemical News* for Nov. 15 has the following note by Prof. Lockyer, with comments:

"Reasoning from analogies furnished by the behavior of known compounds, I have discovered that, independently of calcium, many other bodies hitherto considered as elements are also compound

bodies." In communicating this note to the Academy of Sciences, at the meeting which was held on Oct. 28 last, Mr. Dumas observed that it was the result of three years' assiduous research, in which Mr. Norman Lockyer has, with the greatest care, compared the spectra of the chemical elements with the solar spectrum and other luminous celestial bodies. In the private letter to Mr. Dumas accompanying his note to the Academy, Mr. Lockyer announces that he will shortly send the photographs and other details necessary, which will carry conviction to the minds of the members of the Academy.

From the direction in which Prof. Lockyer has been working it is known that he believes there is but one form of matter, hydrogen. As yet the text of Prof. Lockyer's paper has not been published, and some time must elapse before a critical examination of his proofs by scientists results in confirmation, but there can be little doubt that he must have taken a great step in a direction which promises an affirmative answer to a question often suggested: Are elements really decomposable substances? It has been frequently argued from the history of chemistry, which records numerous examples of bodies supposed to be elementary that have been found to be compound, that by the application of more exact methods of analyses it would be possible to divide "elements" into their constituents. These powerful means still remain to be sought, but the proof that the end can be attained seems now to have been furnished. It is certainly an interesting and curious fact that the spectroscope, which we may term a pioneer of chemical research, has again led the way. The details of the new discovery will be looked forward to with the greatest interest, and the year 1878 may mark a second period of search for the philosopher's stone.

The Strike of the Flint Glass Workers at Pittsburgh.

The strike in the flint glass manufactories of Pittsburgh is quite general and has been a very serious matter. The cause of the trouble is a determination on the part of the manufacturers to put an end to the dictation of the workingmen, to which they have submitted for months past. The men have decided, or assumed to decide, who should be employed and who discharged, what molds should be used, the number of pieces that should make "a turn," and various other matters, some of which they had a right to discuss, but others were none of their business. The mannfacturers very plainly told them so, and served notice that after Thursday of last week they would submit to no dictation on certain points. The workmen in turn notified the employers that they would not accept the conditions. As the consequence most of the factories are idle, with no prospect of a settlement. These works, the number of hands employed and weekly pay is as follows:

Firms.	Hands.	Weekly pay.
Atterbury & Co	110	$1,300
Adams & Co	150	1,800
Doyle & Co	100	1,200
Duncan & Sons	130	1,500
Crystal Glass Co	85	1,050
McKee Bros	160	2,000
Bryce, Walker & Co	130	1,400
Campbell, Jones & Co	125	1,350
Ripley & Co	110	1,200
Richards & Hartley	110	1,300
King, Son & Co	100	1,200
Total	1,305	$16,100

These 11 factories have 15 furnaces and consume monthly about 110,000 bushels of coal, $4000 to $5000 worth of sand, $10,000 of soda, and their stoppage will take from circulation fully $50,000 weekly. In regard to the prospects of continuance of the strike there is a difference of views. It is claimed that a large minority of workingmen have reluctantly acquiesced in the edict of the majority. The manufacturers have had a meeting since receiving the notice and resolved unanimously that unless the workmen reconsidered their refusal and consented to abide by the terms of the "notice" which had been given, within the present week, the end had been reached, or, as an employer present put it, "we will not submit "to any further interference from the union, "and as manufacturers we will conduct our "business to suit ourselves." The issue has been joined, and if the manufacturers are in the right it is to be hoped that they will have more backbone than the iron manufacturers of that city have shown in their labor contests. A strike or "lock out" should never be undertaken until it is an absolute necessity, and then it should be carried to the end. Something more than an order should be the reason for withdrawing. In the past the glass manufacturers and their workmen in Pittsburgh, in contests of this kind, have shown "staying" qualities. The strike in the window glass trade, beginning in 1874, continued for about 13 months. The blowers struck against a reduction of 15 per cent., but at length went to work at 25 per cent., and in a short time were obliged to submit to a further reduction of 15 per cent.

A dispatch from London, under date of Nov. 29, says that the condition of the iron and coal trades in the South Staffordshire district is growing worse. The New British Iron Company of Crudley, one of the largest and oldest coal and iron companies, has given notice of the closing of the greater part of its works, rather than continue operations at a loss. The blast furnace proprietors of South Staffordshire and East Worcestershire have decided to reduce the wages of their employees 10 per cent. The Maryport Hematite Iron Company has also given notice of a reduction of wages. We regret to say that everything points to the fact that British industries generally are in a deplorable condition, and that such reductions of wages are in progress as must inevitably cause great dissatisfaction and lead to serious complications. The British workmen cannot, of course, set at defiance the laws of trade, nor can they control the causes which are now at work to lessen the market value of labor. But they are not always, if often, reasonable, and cannot see very clearly the causes of things. During the past 15 years of activity and prosperity they have emerged from the condition of extreme poverty with which for more than a generation they had been content, and had demanded and obtained a larger share of the profits of production than had ever before been accorded them. Their condition was improved in every way. They ate better food, wore better clothes, enjoyed a greater variety of luxuries, lived in better houses better furnished, and gave their children better advantages. Naturally they have learned to look upon these things as their rights, and while one after another of the benefits gained through organized effort under favorable conditions has been surrendered, they will not give up all they have gained and return to a poverty which borders closely upon pauperism, unless after the bitterest struggle of classes the world has ever seen. The British workman is loyal and conservative. He has almost a superstitious reverence for the established order of things, but he is the most tenacious of men in asserting and defending what he believes to be his rights, and does not reason very closely in matters belonging to the domain of social science or political economy.

Early in the season the Marquette *Mining Journal* contained its usual warning to ore consumers, to the effect that this year would show a scarcity of ore. As is also usual, it was mistaken. In the issue of Nov. 9 it acknowledges its mistake as follows: "The "*Mining Journal* acknowledges itself to "have been a false, or at the best a very "poor prophet, as to the probable out-"put of ore the present season. Its proph-"ecy was based, however, solely upon the "state of the market in the early part of "the season, and was not intended to con-"vey an impression that our mines would "not be abundantly able to supply all the "ore that might be called for. By refer-"ence to the table of shipments, elsewhere "given, it will be seen that instead of the "decrease we predicted early in the sum-"mer, and which the tables showed up to "the last quarter of the season, they now "show an increase of nearly 50,000 tons. "Adding to the late shipments the ore sent "to local furnaces and shipped by rail to "points below Escanaba, and we have al-"ready an aggregate production of over "1,002,000 tons for 1878—to be yet consid-"erably increased before the close of navi-"gation. The present year's product will "exceed that of any previous one, with the "possible exception of 1873."

We regret that the facts are as stated, but we do not well see how it could be otherwise. Overproduction must have the same effect in this branch of the iron trade as in all others. The new ore developments, some of them of as good ores as are found in the Lake Superior region, could not fail to have a decided effect upon the market, weakening the price and resulting in a largely increased output.

We print elsewhere the decision of Judge Blatchford in the case of the United Nickel Company *vs.* Harris and Weston, in which the validity of the Adams patent for the electro-deposition of nickel is affirmed; also a brief account of the proceedings which have since been taken to secure a rehearing on the basis of new and important evidence. Nickel-plating has become of so much importance to many classes of our readers, especially stove manufacturers and makers of metal goods generally, that so important a decision as this cannot be passed over with brief notice.

The Estimation of Phosphorus in Iron and Steel.

To the Editor of The Iron Age.—DEAR SIR: Fourteen months after the publication in the *Metallurgical Review* of my article on the "Determination of Phosphorus in Iron, Steel and Iron Ore," Mr. George Hay has found that the process described by me was claimed as original, and attacks me on the ground both of its want of originality and want of importance. In the first place I did not claim it as original, although I supposed and still believe that it was. Mr. Hay says that Mr. McCreath dissolves in concentrated nitric acid and Mr. Slater in fuming nitric acid. I did neither, but dissolved in nitric acid of 1.20 specific gravity (more than one-half of it is water). I did not only evaporate to dryness as do McCreath and Slater, but I ignited the residue at a red heat in a platinum vessel. The latter I claim to be absolutely necessary in order to remove organic matter (combined carbon), which will prevent full precipitation of phosphorus. My experiments were not made in 1876, but in 1873, at Sharpsville, Pa. I said in my description "some years ago;" by a misprint it was made instead "one year." I was induced to publish the results because I had seen an article in the *Engineering and Mining Journal* in 1876 by a chemist of repute in which it was said: "Dissolve the iron bearings by pouring strong nitric acid over them, and add hydrochloric acid in drops until dissolved." I found that even by this method some of the phosphorus escaped; this I proved by absorbing the phosphorus in the escaping vapor. My article was published to call particular attention to the following facts: First, that hydrochloric acid must not be used in the first solution; secondly, that the residue must not only be evaporated to dryness, but strongly ignited, and thirdly, that after dissolving the yellow precipitate in ammonia, hydrochloric acid should be added to almost neutralize the solution and precipitate the silica (of which some nearly always goes into solution after the first precipitation), and that it should be filtered only after resting at least four hours. Some time after the publication of my article in *The Metallurgical Review* a paper on the estimation of phosphorus in spiegeleisen, by C. Stöckmann, appeared in Fresenius' "Zeitschrift für Analytische Chemie," Vol. 16, 1877, in which the author describes a method which is in many particulars almost precisely equal to mine. In one spiegeleisen he found 0.157 per cent. phosphorus, while another chemist found in the same 0.127 per cent. This discrepancy he found was due to the employment of *aqua regia* in the latter analysis, while he himself used nitric acid of 1.20 specific gravity alone. He then made more careful experiments, in the course of which he also ignited the residue in a porcelain vessel, for the purpose (as he states) of destroying organic matter. Mr. Stöckmann, having published such an article, is therefore open to the same charge of copying from Slater as I was. Mr. Hay's statement that my method contains some errors which he could point out if he thought it worth while, without mentioning what the errors are, is both ungenerous and unscientific. If he would point out these errors or publish some of his own researches he would confer a much greater benefit on the chemical profession than he does by going out of his way to attack other chemists for what he imagines to be want of originality. Yours truly,

A. J. PREUSSE.

PITTSBURGH, Pa., Nov. 28, 1878.

The Strength of Wrought Iron in Structures.*

BY PERCIVAL ROBERTS, JR.

The subject to which I would invite your attention this evening is the strength of wrought iron used in construction. In ancient times philosophers and poets were wont to style the age of iron as one inferior both to that of silver and the brighter one of gold. Now all is changed, and the nations of to-day are ranked in the scale of civilization in proportion to the amount of iron consumed by each individual member. In former times the application of Iron in construction was limited, and was made by guesswork or routine.

An anecdote once told me by a foreigner well illustrates this period, which I trust is forever past. A young German, a university graduate, obtained a position in one of the prominent machine shops of England. Soon after entering upon his duties he was given some heavy piece of machinery to design. Upon this he started, and while engaged in calculating the strains and necessary strength of the various parts he was asked by one of the proprietors what all that "stuff" (as he was pleased to term it) was for. Upon being told, he exclaimed: "All nonsense; we don't work that way here. Go build the machine, and when finished start her going. If she smashes up we shall know what parts are too weak, and if she goes, all right." This, I fear, has until recently been the practice, not only with machinists, but with too many who, under the great palladium of civil engineer, have palmed upon the public their wares in the shape of unsound bridges, and their empiricism has only been made apparent by some awful crash and the investigating labors of a coroner's jury. At the present day a much better era has been entered upon. The once despised theory is now both the handmaiden and the guide to the formerly all-powerful practice. With the aid of mechanics and the higher mathematics, with strain tables, &c., to guide him, the engineer of to-day goes about his work by no means so blindly as he of a previous generation. But in all these calculations it is of paramount importance—nay, an absolute necessity—to have very accurate data as regards the strength of the material to be used. Iron, of which so much is known and about which so little is understood, takes the foremost place among the constructive materials of the present day, and concerning what has already been done, rather than any new theories, shall I make a few remarks this evening. A very unfortunate circumstance is connected with all the earlier experiments upon the subject, namely, that while we have no lack of tabulated statements giving the number of pounds required for tearing asunder and compressing a piece of wrought iron, we are left entirely in the dark as regards the methods employed and the shapes and sizes of the specimens operated on, upon which everything depends.

Mr. S. Hughes, writing for the *Artisan* under date of February, 1858, well sums up in the following sentences the knowledge then possessed concerning the strength of iron: "There is probably no branch of experimental inquiry in which more varying and discordant results have been attained than in that which seeks to determine the absolute strength of wrought iron subjected to a tensile strain, or to the action of a weight applied to tear it asunder." It may be well to remark that the above discordant results varied between the limits of 90,000 pounds and 50,000 pounds per square inch for the ultimate tensile strain—truly no very comfortable data upon which to base one's calculations. In the year 1864 appeared a volume of some 200 pages and 16 plates, published at Glasgow, entitled "Results of an Experimental Inquiry into the Tensile Strength and other Properties of Various Kinds of Wrought Iron and Steel," by David Kirkaldy, undertaken for the Messrs. Napier & Sons, and further enlarged upon at the instigation of the Scottish Shipbuilders' Association—a volume which to-day is out of print; yet the investigations and conclusions therein recorded live in almost all the works of later writers upon this subject. Mr. Kirkaldy, at the outset, with great good judgment, perceived the errors of his predecessors and endeavored to avoid them, especially by giving the fullest details in regard to experiments, even at the risk of becoming tedious and uninteresting. His conclusions no doubt are familiar to all, so that I shall mention but few of the more important ones, prominent among which is that arrived at concerning the shape of the test piece with reference to the tensile strength obtained. He found that if a bar, instead of being of parallel section, be turned down by sinking a fillet into it so that a minimum section occurs at but one point, that specimen would stand a much higher strain before breaking than a piece from the same bar whose section was parallel, the former contracting none whatever at the point of rupture, while the latter would be much reduced. The mean of 14 experiments gave on the grooved section 73,942 pounds per square inch, while the same bars not grooved showed but 62,256 pounds per square inch, a difference of 11,686 pounds in favor of the grooved section. He also pointed out the importance of taking into account the reduction of area of specimen, and sums up the results of his experiments in a set of sixty-six conclusions. The book is full of interest and will well repay perusal. Mr. Kirkaldy, however, made one error in a point which he endeavord to guard against, namely, in omitting sufficient mention of the sizes of the iron from which his test pieces were taken, and his results, which are for the most part rather too high for ordinary iron of moderate dimensions, lead us to conclude that the bars from which his test pieces were taken were of the very small sizes. I will not mention the labors and results of Fairbairn in England, or of the investigators on the Continent, for time will not suffice.

To test correctly, a fundamental requisite is the reliability and fitness of the testing machine employed. Since the days of Kirkaldy's experiments many improvements and new machines have come into existence. The plain and cumbrous lever, with its huge load of weights, has made way for more complicated, but I cannot say more accurate, machines, among which may be mentioned the one using a hydraulic jack, the weight being registered through the pressure in the cylinder; also the screw machine, where force is obtained by means of a powerful screw. But in almost all these the varying amount of friction, whether in the hydraulic packing or the screw, introduces so great a factor of uncertainty as to make the machine utterly worthless. There is at the present time a testing machine built by the Messrs. Riehlé Bros. of this city, which with its latest improvements seems to come up to all the requirements we may need. The force is applied by means of a hydraulic jack worked by three pumps, which are driven by power, the object of the three being to always have one in action, so that the strain be evenly applied and not by jerks, which is the case where a lever and two pumps are employed. The strain applied is weighed upon a beam attached to the other end of the specimen, so that we get without doubt the actual force acting upon the piece. One point in their machine, however, I feel that I cannot too heartily condemn, namely, their method of grasping the test piece by steel wedges with roughened surfaces, whereby distortion of specimen takes place, and I cannot help thinking that the strain in many cases is not transmitted parallel to the axis of the bar, giving results which are not strictly correct. And to-day, when so much iron must be guaranteed as regards strength, and where a difference of a few hundred pounds may reject or admit a specification of many tons, we cannot be too careful in the methods employed.

Until very recently, experiments in this country upon the strength of wrought iron for constructive purposes have been conspicuous for their absence. It is true very complete investigations had been carried on by officers of the Ordance Department upon the fitness of various metals for the manufacture of cannon, yet for ordinary uses little was known except what was gleaned from English works and English conclusions upon English irons, which in many instances are entirely dissimilar from American brands. When specifications for bridges were given out it was frequently made a condition that such and such members should be made from certain brands of English scrap, which were believed to be far superior to anything manufactured in this country. Lately, however, we have awakened to the necessity of a full and complete knowledge concerning the qualities of our own American products of iron and steel, and the testing machine which to-day stands unfinished in the Watertown Arsenal is a monument alike to American genius and mechanical skill, and a disgrace to the short-sighted economy of her representatives in office; for were it but completed it would be the most powerful and accurate machine in existence, capable of testing the longest and largest bars in their natural condition. An abstract by Mr. Holley, one of the members of the United States Commission for testing iron, steel, &c., of the results obtained by the section appointed for testing iron for cables, which has appeared during the present year, gives some very interesting conclusions drawn from their work, which embraced over two thousand tensile tests, each showing elastic limit, elongation and reduction of area; also 42 complete chemical analyses in connection with the above physical tests. The great difficulty, however, which occurs with all quantitative chemical analyses upon the subject is, that when wishing to observe the effect of any one constituent in varying proportions it is impossible to keep the remaining elements unchanged; for instance, to hold phosphorus, sulphur, silicon, &c., at a fixed percentage, while carbon is placed in the ascending or descending scale; for I can say confidently that with all care no two heats of iron, nay no two bars in the same heat, from the same puddling furnace, worked by the same men, will be similar in their chemical composition. Among the more important conclusions drawn in Mr. Holley's paper is the connection between tensile strength and reduction of area of pile by rolling—namely, other things being equal, the greater the section of pile the greater the strength of bar rolled from it. This fact, although known, I am certain, to some manufacturers, appears for the first time upon record in the labors of this commission, and has already borne very good fruit, as may be shown by the following quotation:* "In accordance with the facts, the United States Test Board has shown by trial the unsafety of the admiralty proof tables for chain cable, and has prepared new ones, and also new tables of the strength of different sized bars. The board has demonstrated that the tenacity of 2-inch bar for chain cable should be between 48,000 and 52,000 pounds per square inch, and of 1-inch bar between 53,000 and 57,000 pounds." A fact, I am sure, at which every one will rejoice who has ever attempted to comply with the former too high specifications. Allow me to give the conditions required by the Pennsylvania Railroad Co. to be fulfilled by iron to be used in its bridges, as representing the average specifications of the present time; and with a few remarks upon the same, I shall bring this too rambling paper to a close. The requirements are as follows; "All the wrought iron must be of the best quality, tough and fibrous, free from flaws and injurious cracks along the edges. All the iron in the tensile members, lower chords, tension diagonals, laterals and bolts, must be double rolled from the muck bar direct; no scrap will be allowed [and must be capable of sustaining an ultimate stress of 60,000 pounds per square inch on a turned down or grooved section, with no permanent set under 25,000 pounds per square inch]. Wrought iron will also be acceptable upon the following modifications of that part of the specifications inclosed in brackets, and must be capable of sustaining an ultimate tensile stress of 50,000 pounds per square inch on a full section, with no permanent set under 25,000 pounds per square inch, and with a minimum stretch of 20 per cent. under ultimate stress."

I consider the test piece with grooved section as utterly worthless for any information which may be required concerning the material under examination. It represents an entirely artificial condition, and one which rarely if ever occurs in practice. An iron which would fill the above requirement in all respects might be utterly worthless for tension purposes, very hard, with low limit of elasticity and no ductility whatever. Upon no consideration would I allow iron for any purpose to be tested by the above method. On the other hand, the parallel section represents the natural manner in which the material, for the most part, is used; from it elastic limit and ductility may be obtained, two things about which we know nothing in the first method. To ascertain the limit of elasticity very accurately is surely of more importance than to have the tensile strength to within a few thousand pounds; for strain a piece beyond this limit and no matter what its ultimate strength may be it is but a question of time when rupture will ensue. A soft iron, admirably adapted for resisting shocks, may have an excellent limit of elasticity, great ductility, and yet may not come up in ultimate strength to an iron in every respect much its inferior, so that I think if our factors of safety were only proportioned to the elastic limit, rather than to the ultimate strength, much safer and more accurate results would be obtained than by the methods now employed. Too many seem to be governed by the motto "Safe if unbroken." Again, a few words occur in the specification the importance of which is not generally recognized, nor are their requirements always enforced. For tension members they say all iron "must be double rolled from the muck bar direct." It is not sufficient that the bars stand the required pull, but that they must be double worked; the additional factor of safety which is added by so doing is more than is usually believed. Every time a bar is reduced and repiled with other bars, so much less is the risk of having a finished bar composed of a number of pieces of poor iron. I would urge upon engineers the extreme importance of this point, that they do not, by reason of a mistaken economy, jeopardize the lives and happiness of many thousands of people, rather than pay the slightly increased cost which this double working will entail. It is now much too often only required that the bars stand such and such a pull, no further stipulations being made. In regard to the strength required when the bars are too large to be tested in a natural state, shall test pieces be cut and turned from them, or shall the same iron be rolled, say, into an inch round and tested in original section? For the manufacturer the latter would be much the more fair of the two, for by the time a piece is taken, for instance, from a 7 inch by 3 inch flat, intended for an eye bar, turned and planed down into a test piece of probably ¾-inch diameter, it does not represent the quality of the whole; nay, it matters considerably whether the test piece be cut from the front, middle, or back part of the bar; that from the front of the bar will give higher results than one taken from the back part, when the bar is worked upon a two-high train of rolls, owing no doubt to the inclosed cinder being worked toward the last end of the bar which passes between the rolls. If there were testing machines strong enough to take a bridge member direct, it would be the only proper and pre-eminently just manner in which iron should be tested, but until those machines are forthcoming I think the other method of preparing test pieces should be adhered to. In conclusion, let me urge upon you the importance of frequent and accurate tests; buy no iron from any man without tests of the same. It will stimulate manufacturers to greater carefulness in the preparation of their products; a higher class of goods will be placed upon the market, and structures will arise concerning the safety and stability of whose material no one can question or doubt.

PHILADELPHIA, Oct. 20, 1878.

*A paper read before the Engineers' Club of Philadelphia

*The Strength of Wrought Iron as Affected by its Composition and by its Reduction in Rolling By A. L. Holley, Ph. B., 1878.

Labor Notes.—The drivers at Haberman's coal works, near Six-Mile Ferry, Allegheny county, are on strike for an increase of wages. The miners are consequently idle. —— Mr. G. W. Wells is engaging workmen with a view to resuming operations at his glass factory at Brownsville, Pa. Fires have been put in the furnaces and work will probably be commenced this week. —— The strike of the glass workers at Pittsburgh still continues, with no prospect of a settlement. But two of the factories are in operation; the other ten have let out their grate bars.

AMERICAN SCREW CO.,

Providence, R. I.,

MANUFACTURERS OF MORE THAN 4000 VARIETIES OF PRODUCT,

AND INCREASING THE ASSORTMENT DAILY.

Machinery employed contains important inventions recently patented, and which are designed to produce Screws at a **lower cost to the consumer** than has ever been attained.

All goods are distributed through the Hardware trade, to whom a liberal discount will be allowed.

(*No. 235.*)

INTERNATIONAL EXHIBITION.

PHILADELPHIA, 1876.

The United States Centennial Commission has examined the report of the Judges, and accepted the following reasons, and decreed an award in conformity therewith.

PHILADELPHIA, November 8, 1876.

REPORT ON AWARDS.

Product: **Iron, Brass and Steel Screws, Tire and Stove Bolts, Rivets.**

Name and address of Exhibitor: American Screw Company, Providence, R. I.

The undersigned having examined the product herein described, respectfully recommends the same to the United States Centennial Commission for Award, for the following reasons, viz:

Being of a quality nearly approaching perfection, showing the highest attainment in this branch of manufacture.

G. L. REED. Signature of the Judge.

Approval of Group Judges.

Daniel Steinmetz, G. L. Reed, J. Diffenbach,
Jas. Bain, J. D. Imboden, Dav. McHardy.
Chas. Staples,

A true copy of the record. FRANCIS A. WALKER, Chief of the Bureau of Awards.
Given by authority of the United States Centennial Commission.

A. T. GOSHORN, Director-General.

[L.S.] J. L. CAMPBELL, Secretary. J. R. HAWLEY, President.

After forty years' experience we offer to the trade our Centennial Screws, patented May 30, 1876, as the best we have ever known.

The method of manufacturing is also patented, and we are changing our machinery as fast as possible, to manufacture the improved article only. To introduce them, they will be sold at the same price as the old style screw.

The new screws will be packed in manila colored boxes with the new label covering end of box, and enlarged figures showing plainly contents.

To distinguish this screw we have adopted a trade-mark, which is also secured to us.

The accompanying engravings show the progress of making screw from the old blunt point to style now adopted.

Experience has shown that the wear point of screws, as formerly made, is at the heel of the thread, where all the strains of forcing the screw into the wood naturally concentrate.

To avoid the sharp angle existing in the old style of screws has been the aim of all manufacturers, but every expedient hitherto adopted has proved as objectionable as the evil complained of.

It will be seen in our new screw that not only is the sharp angle avoided, but the strength very much increased, as illustrated. See sections at lines.

CLAIM.

"A Pointed Wood Screw having the outer periphery of the thread upon its body cylindrical, while a portion of the body below the thread and near the neck is conical, the remainder of the body to the point being cylindrical, and yet having all the thread brought to an edge of a constant angle, without jogs in the paths between the threads, substantially as described."

The Adams Nickel-Plating Patent.

Decision of Judge Blatchford in the Case of the United Nickel Company vs. Harris and Weston.

Judge Blatchford's decision in the United States Circuit Court, rendered Oct. 30th, ult., in the case of the United Nickel Company against Geo. J. Harris and Edward Weston, deservedly attracts attention through a wide range of manufacturing arts. This decision affirms the validity of letters patent granted Aug. 3, 1869, to Dr. Isaac Adams, Jr., for an improvement in the electro-deposition of nickel, and is extraordinary in the wide sweep of its application to those alleged to have infringed, if for no other reason than that it covers everything plated with nickel, or, in the nguage of the law, anything "manufactured, sold or used." The question has been whether an injunction could be obtained upon the product alone, without proof that the process employed in plating was an infringement, but Judge Blatchford on Friday of last week granted a series of injunctions, in accordance with his decision, upon the product alone without proof of the process. That is to say, a metal coated with a compact, coherent, tenacious, flexible coating of nickel of sufficient thickness to protect the metal upon which the deposit is made, is held to infringe the patent *per se*. Counsel for the plaintiff produced in court an article plated with nickel (a pistol), and on the simple production of this weapon an injunction was granted. The simple fact of a nickel-plated article having been produced by unlicensed parties was deemed sufficient cause for granting an injunction. It has heretofore been generally held by interested parties that a similarity of process must be proved in order to constitute a case of infringement. But Judge Blatchford holds, and distinctly enunciates it in his decision, that the product, as well as the process, is covered by Dr. Adams's patent. Consequently, a nickel-plated article, or nickel-plating of any kind, is an infringement of the patent, and is a subject for an injunction, regardless of the process by which the coating was applied. Proof in regard to the process is not needed, it only being necessary to show that an article has been coated with nickel by unlicensed parties. It is assumed, therefore, that there is no article covered with nickel that does not infringe the patent. Already about 50 cases are entered upon the court calendar, involving stove manufacturers and leading houses in several other branches. The following is the decision of the Judge in full:

OPINION OF JUDGE BLATCHFORD.

Circuit Court of the United States, Southern District of New York.

THE UNITED NICKEL COMPANY vs. GEORGE J. HARRIS AND EDWARD WESTON.

BLATCHFORD, J.—This suit is brought on two patents granted to Isaac Adams, Jr., one on the 3d of August, 1869, and the other on the 10th of May, 1870, each for an "improvement in the electro-deposition of nickel." In the proofs no evidence is given as to any infringement of the patent of 1870. The case rests on the patent of 1869 alone. The specification says: "It has long been well known that nickel possesses certain qualities which would render it of great value in the arts, if it could be readily and surely deposited by the battery in such a manner as to make those qualities available. These qualities are, first, its infusibility; second, its color, which is nearly that of silver; third, its hardness, which is nearly equal to that of steel, and by reason of which it resists wear and abrasion to a much greater degree than silver; fourth, its power of resisting oxidation and the tarnishing and corrosive effects of many gases and liquids. The two last named qualities render it, for many purposes, greatly superior to silver, which it much resembles in appearance, for electro-plating other metals and for making articles of solid metal. To these advantages should be added its cheapness, as compared with silver. It has long been known that nickel could be deposited from certain solutions by electricity, but the character of the deposits has been such that the valuable qualities of the metal could not be secured to such an extent as to render it practically useful for general purposes. The difficulties in the way of its deposition have arisen mainly from the character of the solutions employed and the nature of the nickel used for anodes in the depositing cell. I have discovered the causes of certain difficulties in the practical deposition of this metal, and am able to remove them, and to point out methods of preparing solutions and the conditions which they must satisfy and under which they must be used, so that solid, coherent, tenacious and flexible nickel can be deposited to any desired amount. I can thus render the electro-deposition of nickel practically valuable, not only for electro-plating other metals, but for that branch of the art of electro-deposition, known as electrotyping; that is, the deposition of nickel upon a surface, not to remain upon it as a permanent coating, but to be removed and used independently of it. My improvements relate, first, to the method of preparing certain solutions from which the nickel is to be deposited, and to the properties and conditions which such solutions must possess; second, to a method of preparing nickel plates for the anodes of the depositing cell; third, to the character of the deposits obtained. In order to explain fully the nature of my invention, it is necessary to refer to certain facts relating to the electro-deposition of metals generally, which have been long known. It is well known that metals are deposited in three conditions, viz., first, as a black powder; second, in a state called reguline metal, that is, in a condition which exhibits the ordinary qualities of the metal; third, in a hard, crystalline condition. For most purposes in the arts, it is necessary that the metals should be deposited in the reguline state, the applications which are made of the powdery or crystalline deposits being very few. There are two applications of the art of electro-deposition which are usually recognized as two distinct branches of the art, and which embrace nearly all its practical uses. One is called electro-plating, and consists in depositing a coating of one metal upon another metal, to remain upon it as a permanent coating. The other application is called electrotyping and consists in depositing one metal upon another, or upon a prepared surface of some other substance, from which it is to be removed, to be used separately from the surface upon which the deposit is made. For each of these purposes the metal must be deposited in the reguline state. It has long been known that the metals differ greatly in the facility with which they can be deposited by the electric current, especially in the reguline form. So, also, different solutions of the same metal differ greatly in respect to the deposits which may be obtained from them. With some solutions it is difficult, if not impossible, to obtain a deposit of reguline metal under any circumstances. The difficulty seems, in some cases, to be inherent in the character of the solution itself. In other cases it is due to the presence of foreign elements, or to the density or temperature of the solution, or to the density of the current employed. Different solutions also differ greatly in the amount of metal which can be deposited with a given strength of current. Some solutions give a deposit of metal, which is the full chemical equivalent of the electricity passing through the solution, while others fall far below it. Solutions also differ within wide limits in respect to the intensity and density of the current required to give a reguline deposit. The differences in solutions in these respects are of great importance with reference to the cost of depositing the metal. The higher the intensity required to effect the deposition of the metal, the greater the cost; and it is obvious that the cost of the deposit will increase in proportion as it falls short of the full amount due to the electricity passing through the solution. Another circumstance is of great importance in the depositing of metals. It often happens that a thin film may be obtained of one metal upon another, but that the process of deposition cannot be carried on to such an extent as to obtain a coating of any appreciable thickness. As soon as the metal to be coated has received a mere film, the condition are so changed that the deposit is practically stopped. A characteristic of this filmy deposit is, that though the particles of the metal adhere separately to the metal on which the deposit is made the deposit is so thin that the particles of the deposit have no such coherence among themselves as will allow the deposit to be removed from the surface on which it is deposited, nor will such a deposit afford any substantial protection against abrasion or the ordinary wear to which most plated articles are subjected, nor to the action of corrosive agents. It is obvious, therefore, that it is impossible to make electrotype plates from such deposits, and that such deposits are practically useless for most purposes to which electro-plating is applied. Although it has long been known that nickel could be deposited to some extent from various solutions, yet I believe that prior to my improvements it has not been practicable to obtain deposits of such character and thickness as are required for electrotyping, or even for most of the purposes of electro-plating. The solutions from which nickel has been heretofore most successfully deposited are, I believe, the chloride of nickel, the cyanide of nickel and potassium, the double sulphate of nickel and ammonia, and the double chloride of nickel and ammonium. Of these solutions, as heretofore prepared, I believe the chloride is the best, but the deposits obtained from it are very far from what it required for the general purposes to which the electro-deposition of this metal may be applied." The specification then points out the difficulties attendant and consequent in the use of the chloride of nickel and of the cyanide of nickel and potassium. It then proceeds: "Neither of these solutions, so far as I have seen them used, gives for any great length of time, the full equivalent of metal for the electricity employed, and so far as I have been able to discover, these two solutions are inherently incapable of giving a coherent, tenacious, flexible metal, such as is required in the arts for electrotyping and electro-plating. Of the other two solutions named, I believe that before my improvements the best results were obtained from the double chloride of nickel and ammonium. But the metal deposited from it is of such a character as to be worthless when deposited to any appreciable thickness. It is accompanied with the deposit of the peroxide, and is, therefore, black or brown. It is extremely liable to split up into thin scales, which may be rubbed off even with the hand. This want of coherence and tenacity unfits it for the requirements of the arts. The metal deposited from the double sulphate of nickel and ammonia is substantially the same as the above, but it is not so easily obtained. If, with these solutions, a battery power is used of an intensity of two Grove cells or thereabouts, a white deposit may be obtained, of considerable thickness, but still with such a tendency to split up in scales, that it is practically useless, and neither solution gives the full equivalent due to the current. I have discovered, however, that the difficulties attending the use of these last named solutions, and the character of their deposits are not inherent in the nature of the solutions, but are due to the modes of preparing them, or to the presence, in minute quantities, of certain substances which are generally, and, I believe, universally employed in making them, or in the reduction of the nickel used in making them. In order, therefore, to prepare these solutions in such a manner as to give the results I have reached, it is necessary to adopt processes in their preparation and observe precautions which shall either dispense with the use of the substances altogether, or shall effectually remove them if they are employed, and which are wholly unnecessary in their preparation for any other use with which I am acquainted. In preparing my solution I prefer to use pure nickel, but commercial nickel may be used. Commercial nickel almost always contains more or less of the reagents employed in the purification or manufacture of the metal, such as sulphate of lime, sulphide of calcium, sulphide of sodium or potassium, chloride of sodium and alumina. When any of these substances are present it is necessary to remove them."

The specification then describes how this may be done, and also how zinc, copper, arsenic and antimony can be removed from the nickel. It then describes the patentee's method of preparing the double sulphate of nickel and ammonia, by first preparing a solution of the sulphate of nickel, and then a solution of the sulphate of ammonia, and then uniting the two, and diluting the mixture with sufficient water to leave one and a half to two ounces of nickel to each gallon of solution. Specific directions are given how to prepare the solution of the sulphate of ammonia. The patentee's mode of preparing the solution of the double chloride of nickel and ammonium is then described. It is then stated that another important part of the patentee's invention is the preparation of the nickel plates to be used as anodes in the depositing cells. This consists in preparing an anode of nickel combined with iron to prevent the copper and arsenic which are present in almost all commercial nickel from being deposited with the nickel or injuring the solution. It is further set forth that when copper and zinc are present to any considerable extent in nickel, it may be melted in a crucible and cast into plates for anodes, and a mode of doing this is described, and that "it is necessary to melt commercial nickel, not only to cast it into plates for anodes, and combine it with iron, when copper and arsenic are present, but to remove any potash, soda, lime or alumina left adhering to it in the process of reduction, these substances being removed as before stated, as slag." One of the methods before described in the specification for purifying commercial nickel for use in making the patentee's solutions so as to remove the reagents before mentioned was to melt the nickel, whereby "the foreign substances collect on the top of the nickel in the form of a slag." The specification proceeds:

"Having prepared the solutions and anodes, as herein described, nickel may be readily deposited, but, in order to carry on the deposition continuously, it is necessary to observe certain precautions: First, the use of a battery of too high an intensity must be avoided. An intensity of two Smee cells is sufficient. A high intensity decomposes the solution and liberates free ammonia, thus rendering the solution alkaline and impairing its value. Whenever the smell of free ammonia arises from the decomposing cell, the operator may be certain that the solution is being injured. It is important that the depositing shall not be forced by the use of too strong a current. Second, it is important that great precaution should be used to prevent the introduction into the solution of even minute quantities of potash, soda or nitric acid. When an article to be coated is cleaned in acid or alkaline water, or is introduced into it for any purpose, the greatest care must be taken to remove all traces of these substances before the article is introduced to the nickel solution, as the introduction of the most minute quantities of acids or alkalies will surely be injurious. It is important that the solution be kept free from all foreign substances, but its purity from those above named is especially important. Third, the anode of the depositing cell should present a surface to the action of the solution somewhat larger than the surface upon which the deposit is being made, particularly in the double sulphate solution. The reason is that nickel dissolves so slowly that if the exposed surface is not larger than the surface on which the deposit is made, the solution will not keep saturated. On the other hand, if the anode is very much larger than the positive pole, it tends to give a deposit of black powder. Fourth, if zinc is to be coated, it should first be coated with copper, as it is difficult to make nickel adhere to zinc, and there is danger that the zinc may be acted on and injure the solution. With solutions and anodes thus prepared and used, the deposition of nickel can be carried on continuously, and almost as surely and certainly as the deposition of copper from the common sulphate solution, though the limits of the battery power which may be used are narrower. The metal deposited is compact, cohesive and tenacious. It may be deposited of nearly uniform thickness over any surface, however large. The deposited metal is capable of being annealed by a heat below a red heat. It then becomes flexible, malleable and ductile. The deposit may be made of any required thickness, either to furnish effectual protection to the metal on which it is deposited, or to be removed and used separately from the surface on which it may be deposited. Thus electroplate of nickel may be produced either as copies of irregular surfaces which it is desired to introduce, or as plain sheets of nickel, which, after being annealed may be rolled, hammered or spun into a variety of forms or articles. These solutions also give the full equivalent of nickel for the electricity employed. I believe deposits possessing these qualities were never produced except by means of my improvements.

"I, therefore, claim: 1. The electro-deposition of nickel by means of a solution of the double sulphate of nickel and ammonia, or a solution of the double chloride of nickel and ammonium, prepared and used in such a manner as to be free from the presence of potash, soda, alumina, lime or nitric acid, or from any acid or alkaline reaction. 2. The use, for the anode of a depositing cell, of nickel combined with iron, to prevent the copper and arsenic which may be present from being deposited with the nickel, or from injuring the solution. 3. The methods herein described for preparing the solution of the double sulphate of nickel and ammonia and the double chloride of nickel and ammonium. 4. The electro-plating of metals with a coating of compact, coherent, tenacious, flexible nickel of sufficient thickness to protect the metal upon which the deposit is made from the action of corrosive agents with which the article may be brought in contact. 5. The deposition of electrotype plates of nickel, to be removed from the surface on which the deposit is made and used separately therefrom."

Only the first and the fourth claims of the patents are alleged to have been infringed by the defendants. The principal contest is as to the first claim.

The third claim is a claim to "the methods herein described, preparing the solution of the double sulphate of nickel and ammonia and the double chloride of nickel and ammonium." This is the same thing as a claim to each solution prepared by the method described for preparing each. The specification sets forth that the solutions prepared by the methods described in it will be free from the presence of potash, soda, alumina, lime and nitric acid, and from everything which will cause an acid or an alkaline reaction. The means of securing this result, by removing from commercial nickel, when employed in making the solutions by the patentee's methods, the reagents named in the specification, are set forth. If these reagents are removed, and the directions given as to the removal of the other foreign substances mentioned are followed, the solutions made by the patentee's methods will be free from the presence of the injurious substances mentioned in the first claim. But the properties and conditions mentioned in the specification as those which solutions prepared according to the patentee's methods, but by all solutions of the double sulphate of nickel and ammonia and all solutions of the double chloride of nickel and ammonium, so far as regards freedom from the presence of the substances mentioned in the first claim; and in respect to the use of solutions of such double sulphate and of solutions of such double chloride, it is stated, not only that the solutions prepared by the patentee's methods must be so used as to be free, in and during the operation of plating, from the presence of the substances mentioned in the first claim, but that all solutions of such double sulphate and all solutions of such double chloride, by whatever method prepared, must be so used as to be free, in and during the operation of plating, from the presence of such substances. Thus, the specification states that the patentee has discovered that the difficulties which he mentions as attending the use of a solution of the double sulphate of nickel and ammonia and the use of a solution of the double chloride of nickel and ammonium are due to the presence of certain substances employed in making the solutions, or in reducing the nickel used in making them. It also states, substantially, that such employment of those substances results in producing solutions in which, in and through their use, the substances mentioned in the first claim will be present while the electro-deposition of the nickel is going on. It states, also, that in order to prepare the solutions in such manner as to give the results which the patentee has reached, the substances referred to as employed in making the solutions or in reducing the nickel used in making them must either not be so employed or must be effectually removed if they are employed. Those substances are enumerated as sulphate of lime, sulphide of calcium, sulphide of sodium, sulphide of potassium, chloride of sodium and alumina. But it is also further stated that no quantity, however minute, of potash, soda, or nitric acid, or of any acid or alkali, must be allowed to be present in the solutions; and then the claim states that the solution used must be free from the presence of potash, soda, alumina, lime and nitric acid, and from everything which will produce an acid or an alkaline reaction while the electro-deposition of nickel is going on. Lime, soda, and potash are likely to be produced in the solution while the electro-deposition is going on if the sulphate of lime and the sulphate of sodium and the chloride of sodium, and the sulphide of potassium, are employed in making the solutions or in reducing the nickel used in making them and are not removed. So they may be produced in using a solution if the sulphate of lime and the sulphide of sodium, and the chloride of sodium and the sulphide of potassium are introduced into the solution after it is prepared. But if those substances are introduced into a solution, and then the solution is used under such conditions that these substances remain inert so far as the production in the solution of free lime or free soda, or free potash is concerned, and no free lime, or free soda or free potash is produced, then none is present, and the solution is used in such manner as to be free from the presence of those articles. Viewed in the light of these considerations, it is manifest that the first claim is a claim to the electro-deposition of nickel by means of any solution of the double sulphate of nickel and ammonia, or if any solution of the double chloride of nickel and ammonium, however such solution may be prepared, provided such solution is so used as to be free while the electro-deposition of the nickel is going on, from the presence of potash, soda, alumina, lime, or nitric acid, or from any acid or alkaline reaction. This is a valid claim, and the invention covered by it is a patentable invention, if the patentee was the first discoverer of the fact that the difficulties in the way of securing proper results in the electro-desposition of nickel, with the two solutions in question, were due to the existence or development in them, while being used, of the substances named in the claim, and if he describes methods of making such solutions which will secure the absence of such substances, a person, learning from the specification of the patent what such difficulties are, may proceed to make the solutions by other methods than those described by the patentee and covered by third claim; but if he avails himself of the knowledge imparted by the specification that he must take care to secure the absence of the substances named in the first claim, and prepares solutions which, in use, are free from those substances, and then practices the electro-deposition of nickel by means of such solutions, he infringes the first claim of the patent. So, too, a person infringes such claim who, taking such solutions made by another person by such other methods, practices the electro-deposition of nickel by means of them, provided he so uses such solutions that, in use, they are free from the substances named in the first claim, and thus avail himself of such knowledge imparted by the specification

The patent being based on the discovery by the patentee that the difficulties he sets forth are due to the presence, in the use of the solutions in question, in the electro-deposition of nickel of the substances named in the first claim, the evidence shows satisfactorily that such difficulties existed and were due to the causes assigned, and that the patentee discovered, and was the first to discover, what such causes were. It also shows that he invented and described practical methods of getting rid of such causes. As a consequence, he was the first person who obtained as practical results in the electro-deposition of nickel the results set forth in the specification as those due to the use of the invention covered by the first claim.

On the question of infringement the defendants claim that if they introduce into a solution of the double sulphate of nickel and ammonia, or into a solution of the double chloride of nickel and ammonium, a sulphate or a chloride of potash or soda, they do not infringe the first claim. The evidence shows that those sulphates and chlorides may be introduced into the solutions, and that then the solutions may be so used in the electro-deposition of nickel that the sulphate or the chloride will not be decomposed, and there will not result from such introduction the presence of potash or soda in the sense in which the word "presence" is used in the first claim. The injurious substance is inert by being in the chemical state of a sulphate or a chloride, as inert as if it were inclosed in an impervious bottle. The defendant used solutions which were free from the substances named in the first claim otherwise than as such solutions had in them the sulphate or the chloride of potash or soda, and, in the use of the solutions, the presence of such sulphates or chlorides had no more effect to cause free potash or soda to be present than if such sulphates or chlorides had not been introduced. If the introduction of such sulphates or chlorides is otherwise of any benefit, their use is but an improvement, and the invention of the patentee is availed of notwithstanding their introduction.

On the question of the novelty of the invention covered by the first claim of the patent, I am of the same opinion announced by Judge Shepley in his decision in the case of the United Nickel Company vs. Anthes, in May, 1872, that prior to the discoveries of the patentee, the electro-deposition of nickel by means of such solutions as are described in his patent, "prepared and used in the described manner, so as to be free from foreign substances and acid, and alkaline reactions, which would interfere with the uniform continuous and coherent deposition of the metal, was unknown in any practical application of it to the useful art of electro-plating metals with nickel." I concur also on all the evidence in this case, in what was said by Judge Shepley in his decision in the case of the United Nickel Company vs. Keith, in February, 1874, that prior to the discoveries of the patentee "electro-platers and electro-metallurgists well understood how desirable a result it would be to be able to plate the surface of baser metals with a coating of nickel resembling silver in luster and color, without its liability to tarnish on exposure to the air," but that after great research and investigation it has not been shown that the electro-plating of metals with nickel had any practical existence as a useful art accessible or beneficial to the public before the date of the inventions of the patentee; while, on the contrary, he was the first person who effected "the uniform continuous and coherent deposit" of nickel upon the surface of other metals, "so as to produce a coating of the desired thickness, purity, uniformity, coherence and permanence of adhesion." In saying this I have not overlooked the additional evidence in this case, as to what was done by Remington, nor the Muspratt-Stohmann publication. I do not find in the evidence, on the point of novelty, anything which shows that the invention covered by the first claim of the patent, as I have construed that invention, was not new with the patentee, or existed before he made such invention.

Great stress is laid by the defendants on the view that the patentee described his own methods of preparing the solutions referred to, as the only methods by which the injurious substances named in the first claim can be excluded from the solutions; that he does not state that there are other methods than those which he described, by which the solutions may be so prepared as, when prepared, to be free from such injurious substances; and that he does not show how, when the solutions are used, they are to be used so as to prevent the development or presence of such injurious substances. The answer to this view is that the patentee sets forth clearly that the substances he names in his first claim are injurious, that the solutions should be prepared by such methods as not to use what may produce such substances, or to remove what is so used, and then that care should be taken not to introduce into the solution, after it is prepared and while it is being used, any of the injurious substances, and not to use a battery of too high intensity. The evidence shows that what is so not to be used in preparing the solution, or, if used, is to be removed, is something which if decomposed will produce the injurious substances, and that the directions of the patent, if followed, will prevent such decomposition, and the consequent production of the injurious substances in the use of the solution in the electro-deposition of the nickel.

The proper construction of the fourth claim of the patent of 1869 is that it is a claim to the product or coating named, in its having the qualities described in it when such product or coating is produced by employing the invention covered by the first claim. Under this construction the novelty of the fourth claim is not successfully attacked. As the defendants have infringed the first claim, they have also infringed the fourth claim. There must be the usual decree for the plaintiff on those two claims.

DICKERSON & BEAMAN,
For the Plaintiff.
FROST & COE and C. F. BLAKE,
For the Defendants.

On Monday last, through the courtesy of Judge Blatchford, who had signified his willingness to hear any new statements or evidence that might be presented, the whole case was laid before him for a rehearing. The defendants—Messrs. Harris, Weston and others—were fortified by associating Hon. Roscoe Conkling with their counsel. There were also present eminent chemical experts, including Drs. Doremus and Seeley, who were prepared with apparatus to demonstrate in a practical manner that no patent had been infringed. Counsel for

the plaintiffs objected. Thereupon Mr. Conkling took the floor, first submitting voluminous affidavits. He warmed up with his subject until the audience, notwithstanding the abundance of technical terms and meager materials for oratory, found it difficult to restrain their applause. Ground was taken that Dr. Adams made no new invention, but was simply shrewd enough to take advantage of the coming popularity of nickel plate. To admit his claim was to concede that he invented a chemical impossibility, and for the reason that he claims to have discovered a means of removing all traces of potash, soda, alumina and lime from the solution and preventing their introduction during the process of plating. It is in evidence that the presence in the solution of the so-called deleterious substances in any large amounts rather proves an advantage than otherwise to the process of nickel deposition. In other words, the Adams patent was for a process of purifying the solution from certain ingredients which improved the plating qualities, but it was shown that these could be put in the solution without any detriment whatever, and, in fact, the patent was for an improvement which was no improvement; therefore the patent is of no account. As stated by counsel, the whole question turned on the point whether they could patent a law of God.

Mr. Dickerson, in reply, attempted to overthrow the entire substance of the affidavits submitted by the opposing counsel, and to refute the argument of the New York Senator. He opened his address on Tuesday morning, consuming most of the day, and examined in detail all the points made by his antagonist and the several deponents. A part of the evidence offered he pronounced "vicious and despicable," and he did not hesitate to criticise in severe terms both the rhetoric and the reason of the distinguished gentleman "imported" from Oneida county. He would not deny that the defendants might be using with success other solutions than that described in the Adams patent, for that was immaterial, but he demanded protection for the rights of his client. If there had been no infringement, why this array of eminent counsel in defense of a process that could not be reached? He had heard nothing new and doubted whether his honor, Judge Blatchford, had received a single new idea. He would stand on his title, vindicated by three judicial decisions.

The litigants do not expect a final decision from the court for several days; nor can the result be anticipated. The defense, however, affirm that the main point has been conceded in their favor; that the original decision was based on the necessity of excluding from the nickel solution certain substances alleged to be injurious, whereas the plaintiffs, they say, now freely admit that they have no deleterious effect whatever.

Scientific and Technical Notes.

It will be welcome news to metallurgical and mineralogical chemists that Prof. Bunsen, of Heidelberg, has perfected a new and accurate method of

SEPARATING ARSENIC AND ANTIMONY.

The two metals, having been precipitated by sulphuric acid in the usual course of analysis, are dissolved in a solution of caustic potash which has been purified by solution in alcohol, filtering, evaporating and redissolving in water. Into this solution of the two sulphides is passed chlorine gas until all the alkali is saturated. A little hydrochloric acid is added and the solution evaporated to one-third; hydrochloric acid is again added, and the liquid is again evaporated until all trace of chlorine is removed. A saturated solution of sulphuretted hydrogen (not the gas itself) is added in the proportion of 100 c. c. of the solution to one decigram of antimonic acid. It is most remarkable that this precipitates all the antimony as Sb_2S_5, free from arsenic. As soon as the precipitate has settled, a current of air is blown through the liquid and precipitate by means of a common glass-blower's bellows, the air being filtered through cotton. When all the sulphuretted hydrogen has been expelled, it is filtered on a weighed filter, washed as below described, and dried at 110°C. (230° F.) on a bath of common salt, and weighed as Sb_2S_5, which contains 60.4 per cent. metallic antimony, with scarcely a trace of arsenic, which can be removed, if desired, by repeating the operation. To the filtrate is added a little chlorine water, after which the arsenic is precipitated by sulphuretted hydrogen acid as As_2S_5, or pentasulphide, which is likewise filtered on a tared filter and washed with water, alcohol, bisulphide of carbon, and alcohol again to remove any free sulphur. It is now dried at 110° C. and weighed as As_2S_5, which contains 48.4 per cent. of metallic arsenic. The experiments of Prof. Bunsen and his assistant, Mr. Maegis, have proved that this little-known pentasulphide is of constant composition if dried at this temperature, which is not true of arseniate of magnesia and other salts formerly considered so.

French industry has succeeded in devising methods for extracting

VEGETABLE ISINGLASS FROM SEAWEED

instead of importing it, as hitherto, from Eastern Asia. It is, in its crude state, a yellowish gelatine, but which, after repeated experiments under the auspices of the Industrial Society of Rouen, has been successfully converted into what bids fair to prove the best sizing for cotton cloth known. Macerated in water for 12 hours, boiled for 15 minutes and stirred till it is cold, the article gives a clear solution, which, as it does not again become a jelly, can be laid in its cold state upon any textile fabric and be left to dry. One invaluable property it possesses is that of defying, at common temperatures, damp and mildew, and is therefore being applied to give luster not only to French prints and muslins, but to woolens and silks.

A means for

MAKING PAPER TRANSPARENT

has been found to be a varnish made of Canada balsam dissolved in turpentine. The mode by which this is most satisfactorily accomplished is by applying a pretty thin coating of this varnish to the paper so as to permeate it thoroughly, after which it is to be coated on both sides with a much thicker solution. The paper is kept warm by performing the operation before a hot fire, and a third or even a fourth coating may be applied until the texture of the paper is seen to merge into a homogeneous translucency. Paper prepared according to this process is said to come nearer than any other to the highest standard of perfection in transparent paper. Care must be used in making, as the materials are highly inflammable.

Captain Bourden, of the government factories at Tulle, France, has been successful in what he calls

"BRONZING" IRON

to protect it from rust, and which, according to the description published, seems to be really a repetition of Mr. G. Bower's modification of the Barff process. Captain Bourden's first attempts were to protect fire-arms by Prof. Barff's method, and this he was able to do, but in working out the method he conceived the idea of replacing steam by hot air. This was also accomplished, and in June the process was tried on 400 rifle barrels at once. The French government has already adopted this process at some of its arsenal manufactories. The method is simply to pass the current of air at a high temperature over the articles to be covered, care being taken to pass the air through very slowly, and to secure an entirely free circulation about the articles. At a temperature of 536° F. articles exposed for five hours resisted the action of emery paper and dilute sulphuric acid.

The following

MIXTURES FOR ETCHING DIFFERENT METALS

are given by A. Herrburger in the *Chem. Centralblatt*: For steel, mix 40 parts of pure concentrated acetic acid and 10 parts of absolute alcohol with 10 parts of nitric acid, or dissolve 20 parts of soda and 50 parts of iodide of potassium in 400 parts of water. For copper, dilute 100 parts of fuming nitric acid with 700 parts of water and add a boiling solution of 20 parts of chlorate of potash in 200 parts of water. For lighter tints, dilute this solution. For zinc, boil 40 parts of crushed galls in 560 parts of water, strain through linen and add two drops of nitric and three to four drops of hydrochloric acid. These etching fluids avoid the formation of gas bubbles on the metal and of offensive fumes.

In connection with Mr. Edison's invention of the tasimeter, Mr. A. C. Ranyard points out

AN EARLY OBSERVATION OF THE HEAT UPON ELECTRICITY,

made as long ago as 1842 by Magrini, of Milan, who found that the needle of a galvanometer in circuit with an old-fashioned thermopile was thrown at right angles to its zero position.

A German inventor, Mr. Schmidt, has recently patented a

STONE CLEAVING MACHINE,

especially designed for dividing granite blocks. The cleaving is effected by means of a prismatic steel cutter inserted with wedges in the under side of the hammer, and opposite a similar one below on the anvil bed. The granite-block to be cleft is pulled on rollers over the lower cutter (which is slightly higher than the rollers), and into the proper position. Then a rapid series of blows is given from a short hight, followed bp a strong blow from a great hight. Thus a plate is cut vertically with accurately even surface. The block is next pushed on one plate-thickness, and the process is repeated. The plates obtained are afterward divided into cubical blocks by means of a steam hammer, arranged quite like the former, except that the plates, instead of lying on rollers, are placed on small tables resting on spiral springs. By the weight of the stones the springs are compressed, so that the stones come to lie on the lower cutter.

An apparatus has been recently devised by M. Celi for experimenting on the

ACTION OF ELETRICITY ON LIVING PLANTS.

It consists of a large bell jar, into which electricity is admitted thus: An insulated metallic vessel is placed on a support about 6 feet high, and filled with water, which is then allowed to flow out by a very narrow tube. The vessel thus becomes charged with electricity, positive or negative, according to the state of the atmosphere (commonly the former). A collector, formed of metallic wire, is attached to this vessel, and penetrates into the bell jar, where it is connected with a crown of sharp metallic points for distributing the electricity. Under the bell jar are placed plants in vessels communicating with the ground. The bell jar is supported on glass, and air can be admitted or withdrawn through tubulures connected with a trompe. For comparison, similar plants to those under electric action are inclosed by another bell jar of the same size without application of electricity, but otherwise treated similarly. On July 30, M. Celi sowed some grains of maize. On Aug. 10 the plants in the electrified air had a length of 6.6 inches, while those in the unelectrified air were only 3.1 inches. Some researches on the composition of the air and the plants are in progress.

The Troy *Times* gives the following account of

A VENERABLE LOCOMOTIVE ENGINE

at present in operation on the Troy and Boston Railroad. It is known as "the Pony" and has been at the same humble vocation of yard duty for the past 26 years, or since the Troy and Boston Railroad was started. The locomotive is an oddity, by reason of peculiar construction and the wide difference from its associates, being devoid of tender or forward truck, is very low, and has only two driving wheels on each side. The coal and water tank and cab all rest above the boiler, giving it a huddled or dromedary appearance. The lack of forward wheels imparts to its movements a jerky motion at all times. Forty-six years ago it was purchased, with two others of similar make, by the Rensselaer and Saratoga Co., and used to draw passenger trains between Troy and Saratoga. The three were named the Ajax (now the Pony), Hector and Agamemnon. The other two have long since been superannuated and passed into oblivion. When first utilized hereabouts, in the year 1832, the old style of "scrap" rails was in vogue, and railroading, compared with its present development, was rather primitive. Like the Irishman's boot that lasted seven years, the Pony has been so often rebuilt that there is probably not a bolt or nut of the original structure left, yet the locomotive has been known about here for almost half a century.

Stenberg of Germany has constructed a

HYDROPARABOLIC REGULATOR

which has no balls or rods. The action is brought about by a certain amount of glycerine which is enclosed in a rotating vessel covered with a plate. By the rotation of the vessel the liquid has the tendency to rise along the walls, and according to the velocity of rotation presses more or less upon the plate, which being connected with the vertical rod by a membrane effects the movement of a joint which may be easily transferred to the throttling apparatus.

In a note to the French Academy, Berthelot announces the discovery of a

NEW METAL, DECIPIUM,

found in Sanvarskite.

Explorers have recently reported the discovery of an

ENORMOUS SUBMARINE PLANT

in the North Pacific Ocean. It is known to botanists as the *Macrocistis Pyritera*, is said to dwarf all vegetable products yet known by its prodigious proportions. It grows sometimes to such a size as to cover vast areas of sea-bed, one specimen having been discovered that occupied by measurement three square miles, while the stem was 8 feet thick.

The Giffard Captive Balloon, at Paris, has it seems been made to serve for some interesting

EXPERIMENTS WITH ANEROID BAROMETERS.

It was discovered that all, or nearly all, the barometers, after registering the ascent, failed to record the difference in altitude until some time after they had been returned to the earth.

A very beautiful alloy, applicable as a

SUBSTITUTE FOR GOLD

in the manufacture of jewelry, has been produced by Meiffren & Co., of Marseilles. They place in a crucible 800 parts pure copper, 25 parts parts of platinum and 10 parts of tungstic acid, and when the metals are completely melted they stir and granulate them by running them into water containing 500 grams of slaked lime and 500 grams of carbonate of 'potash for every cubic meter of water. This mixture dissolved in water has the property of rendering the alloy still purer. They then collect the granulated metal, dry it, and after having remelted in a crucible they add 170 parts of fine gold. An alloy is thus produced, which, when run into ingots, presents the appearance of red gold of the standard 750.1000, and to which may be applied the name of "aphthite," or unalterable. They can change the color of the alloy by varying the proportions of the different metals. As flux they use boric acid, nitrate of soda, and chloride of sodium previously melted together in equal proportions. The proportion of flux to be employed is 25 grams per kilogram of the alloy.

Dingler's Poly. Journal gives the following description of a

NEW CEMENT,

discovered by A. C. Fox. It consists of a chromium preparation and isinglass, and forms a solid cement, which is not only insoluble in hot and cold water, but even in steam, while neither acids nor alkalies have any action upon it. The chromium preparation and the isinglass or gelatine do not come into contact until the moment the cement is desired, and when applied to adhesive envelopes, for which the author holds it to be especially adapted, the one material is put on the envelope covered by the flap (and therefore not touched by the tongue), while the isinglass, dissolved in acetic acid, is applied under the flap. The chromium preparation is made by dissolving crystallized chromic acid in water; 2.5 grams of crystallized chromic acid, 15 of water and 15 of ammonia are taken, and to this solution about 10 drops of sulphuric acid are added, and finally 30 grams of sulphate of ammonia and 4 grams of fine white paper. In the case of envelopes this is applied to that portion lying under the flap, while a solution prepared by dissolving isinglass in dilute acetic acid (one part acid to seven parts water) is applied to the flap of the envelope. The latter is moistened, and then is pressed down upon the chromic preparation, when the two unite, forming, as we have said, a firm and insoluble cement.

Mining and Mineral Items.

COAL.

Under the decision of the Anthracite Board of Control the allotments to the different interests for shipment during November and December are as follows, being an increase of 2,000,000 tons:

	Tons.
Reading	832,587
Lehigh Valley	689,596
Central of N. J	483,837
D. L. & W	442,000
D. & H. Canal	493,642
Pennsylvania Railroad	208,674
Pennsylvania Coal Co	223,644
Total	3,223,989

Immense beds of anthracite coal exist near the Yaqui River, Sonora, and within 120 miles of Guaymas. This coal has been repeatedly analyzed and proved to be a genuine anthracite, free from sulphur. A specimen of it is now in the *Sentinel* office, and its character is readily recognized by any experienced coal dealer or miner. These Sonora anthracite beds are destined to play a very important part in the development of the base metal mines of Southeastern Arizona. A railroad from Tuckson to Guaymas is an affair of the near future. Then there will be brought together at tide-water, on a perfect harbor, lead and copper ores and anthracite coal; the results of such a combination are not difficult to predict.—*Yuma (Arizona) Herald.*

A Massillon (Ohio) correspondent, under date of Nov. 17, writes: Work at the coal works in this valley continues very brisk. The Massillon City Coal Company and the Pigeon Run Coal Company each put out over 10,000 tons of coal last month, and are doing qually well this month. The two banks of the Grove Coal Company are running steady. The Warmington mine shut down last Thursday for the winter. The Willow bank and the Willow No. 3 are running steady. The Mountain is doing well and increasing their force, with good prospects of running all winter. The Prescott has been running with a few men. Crawford's slope is working about 30 men drawing pillars, and will likely work all winter. The Abidare shaft has been doing well the past month, and is putting in more men as fast as they can be had. Williamson's shaft is now doing better than it has done for some time, employing about 60 men, with a fair prospect of continuing during the winter. The Sippo Coal Company will have the branch road built up to their mines in a few days, and commence shipping by rail.

The Gilberton Colliery at Gilberton, Pa., is in the hands of the sheriff, having worked but two days this month. The Gilbert Coal Company, lessees and operators, refused to pay the stipulated rentals for their coal, and the landlords distrained for rent and took possession of the colliery, which is one of the best in the region. At present the indications are that the colliery will be idle until the legal proceedings are ended and a new lessee found.

The Imperial Coal Company, whose colliery is at Montour, Allegheny county, and near the line of the Pittsburgh and Lake Erie Railroad, have reached coal, and will commence mining soon. They are building a railroad from the mouth of Montour run, on the line of the above-named railroad, to their mines—a distance of 12 miles—and will have it completed by Christmas.

There has been considerable improvement in the coal trade the past few weeks in the Braidwood, Ill., region, and it is reported the prospects for a good winter's work in the mines are quite flattering.

The receipts of coal at Cincinnati for the year closing Sept. 1 were 38,892,229 bushels, a falling off of about 700,000 in comparison with last year; 36,798,454 bushels were received by water, the balance by rail.

All the coal works in the vicinity of West Elizabeth, Pa., are busy.

Of the coal mines on the Sharpsville Railroad, Pierce, Frampton & Co.'s and John Phillips & Co.'s mines are running full time, supplying coal to the furnaces here. Home Nos. 1 and 2, Oakland No. 3, Hickory, and Snyder No. 2, are running from quarter to half time, on local orders and special shipments to Chicago and elsewhere.

The slope of Humphries & Coleman, near Wadsworth, Ohio, is running to its full capacity, employing about 100 men. They have not been able to get out enough coal to keep up with their orders. Weaver's slope, near the same place, is also running steady, employing about 60 men.

The Norton Coal Company, at Dennison, Ohio, has now about 100 men at work, and cannot get out coal to fill their orders. They have sunk a new slope and opened into an excellent quality of coal. They are pushing the entries, running three eight-hour shifts, and expect to put more men to work at an early day. The old drift is pretty well worked out. This company coals all the freight engines passing on the Atlantic and Great Western road.

Bellevue is still uneasy in its mine. The underground revolution continues, and is extending toward the Dodge and Scranton Coal Company's colliery. In some places the convulsions are quite severe, and the terrific force of the downward pressure is shown in the fact that several pillars have been crushed through from one vein into another by the terrific force. The veins in operation at this colliery are the Diamond, Rock, Big Vein and Clark, in each of which the rumbling and threatening still are felt, but there is nothing of a serious nature to be recorded as the result of yesterday. In some places whole fields have sunk without a break, and it is estimated that the foundation of the Bellevue church has fallen at least a foot from its former level. Another extensive fall is expected before the "cave in" has entirely settled. Every precaution has been taken to avert danger, however, and nothing very serious is likely to ensue. —*Pottsville Journal.*

The coal works at Akron, Ohio, and in the neighborhood of Thomastown are doing very well at present. The Bruster Bros.' slope, Middleberry shaft, Spiker's bank and the Brewster bank are all running steady.

The several collieries of R. H. Powell & Co. and Besioniel, White & Co., at Houtzdale, Pa., are the only ones that are doing anything at present.

A Doylestown (Ohio) correspondent, writing under date of Nov. 26, says: The Silver Creek Mining Company are now running their new shaft to its full capacity, employing 175 men; also their drift mine, employing 100 men. Last month this company shipped in the neighborhood of 13,000 tons. Their old shaft has been worked out and the machinery removed.

The case of Lee and Everts against the Jeddo Coal Company, which has been before our courts for the last 10 or 12 years, and tried here two or three times in one shape or another, and was heard in the Supreme Court, has finally been disposed of and ended. It involved the validity of a tax title claimed by the plaintiffs to the lands and coal works of the company situated in the township of Foster, this county. It resulted in a verdict in favor of the defendants. Messrs. Darling and Palmer appeared for plaintiff and Mr. Charles Pike for the defendants.—*Record of the Times.*

IRON.

We take the following from the Marquette *Mining Journal* of the 23d inst.: Michigamme shipments so far this season, 57,534 tons. The Scranton silver mine, Iron River district, was sold the other day on execution for the trifling sum of $700. The Cleveland mine shipments up to the 20th, not including ore sent by rail to Michigan and Wisconsin furnaces, amounted to 111,571 gross tons—a considerable falling off from last year's product. The total shipments from the Menominee range mines for the season up to the 20th inst., exclusive of ore forwarded by rail, aggregates 82,662 tons. Large quantities of white manganese ore are almost daily found in the mines on the hematite hills of Negaunee. The Republic mine has completed its shipments, closing with a grand total of 176,223 gross tons. This is the largest product ever achieved by any mine in the district in one year, with the single exception of the Lake Superior, which made 185,070 gross tons in 1872.

PRECIOUS METALS.

The decline in valuation on the San Francisco Stock Exchange since Oct. 31 has been fearful. The figures are:

	Nov. 1.	Nov. 28.
Alpha	14¾	10
Belcher	8⅞	5
Best and Belcher	25	15⅛
Bullion	14	7
Caledonia	4⅞	2⅜
California	11¾	9
Chollar-Potosi	61	36
Consolidated Virginia	12	7⅛
Crown Point	10⅛	5⅜
Eureka Consolidated	34⅜	35
Exchequer	6¾	4¼
Gould and Curry	17⅜	8⅛
Grand Prize	7	10⅜
Hale and Norcross	23¾	12½
Julia Consolidated	6¾	3
Justice	8⅛	4
Mexican	73½	30
Ophir	55	40
Overman	27⅝	12
Raymond and Ely	7	9¾
Savage	22¾	10¾
Sierra Nevada	189	45
Union Consolidated	158	56
Yellow Jacket	24¾	14¾
Bodie	19½	16

A compromise was effected on Nov. 25 between J. C. Flood, representing the Union Consolidated, and John Skae, representing the Sierra Nevada, by which the Sierra Nevada deeds to the Union Consolidated its interest in 35 feet of ground lying within the Union lines, and also 48 feet of disputed ground lying next to the north line of the Union. The remainder, 298 feet, of the disputed ground becomes the property of the Sierra Nevada. This brings the incline of the Sierra Nevada in which ore was lately discovered within 20 feet, or, as some accounts say, within 12 feet, of the southerly line of the mine. The trustees of both mines met to-day and ratified the terms of the compromise. Some accounts are to the effect that Flood & Co. have in the settlement obtained control of the Sierra Nevada—others that Mr. Skae retains control.

A new mining district has been organized in Washoe county, Nev., four miles north from Reno, called the Reno mining district. Some 20 or 30 locations have already been made and the prospects are now quite flattering. The average of six assays taken from the Esmeralda Consolidated at a depth of 70 feet, is $106.78. Two companies have been recently incorporated, viz.: Esmeralda Consolidated Mining Company and the Monona Mining Company.

The Derby (Conn.) Silver Company's capital stock has been increased from $100,000 to $140,000.

The following are the estimates and actual returns which have been furnished the director of the mint of the out-turn of the precious metals from the various States and Territories during the last fiscal year, the aggregate of which appears to be somewhat below, in gold at least, the actual amount deposited at the mints:

	Gold.	Silver.	Total.
California	$15,260,676	2,373,389	17,734,068
Nevada	19,546,513	28,130,350	47,676,863
Colorado	3,366,404	5,394,940	8,781,314
Monta a	2,260,511	1,669,635	3,930,146
Idaho	1,150,000	2,200,000	1,350,000
Utah	382,000	5,208,000	5,000,000
Arizona	500,000	3,000,000	3,500,000
N. Mexico	175,000	500,000	675,000
Oregon	1,000,000	100,000	1,100,000
Washington	300,000	25,000	325,000
Dakota	3,000,000	.....	3,000,000
Lake Superior	.....	100,000	100,000
North Carolina	150,000	.....	150,000
Georgia	100,000	.....	100,000
Other sources	25,000	25,000	50,000
Total	$47,226,107	48,726,314	93,952,421

The October yield of the precious metals on the Pacific Coast is estimated at $2,250,100. The lightest month for years.

From the Ontonagon (Mich.) *Miner* we learn that the enormous production of silver still continues at Silver Islet.

GLASS NOTES.

The National Glass Factory at Bellaire, Ohio, is running steady. Thirty shops are on.

Peter Sweeney's Glass Factory at Wheeling, W. Va., is operating 12 chimney shops, and has plenty of orders.

The chimney factory at Martinsville, Ohio, is working steadily. They have 34 shops in successful operation.

The Keystone Chimney Works, Pittsburgh, are operating 34 shops full time. This firm is one month behind their orders.

Plunkett & Ihmsen, glass chimney makers of the Southside, Pittsburgh, are running 34 shops full time.

The "Whoa Emma" Glass Factory, Mansfield, Pa., is running 3 pots on a patent blue top chimney—a specialty.

The Penn Glass Works, Pittsburgh, has closed down for repairs. It is proposed to enlarge the works.

Lindsey & Co., Mansfield, Pa., are running 34 shops on chimneys full time, and with good prospects.

On the 21st ult. the fires were lighted in one of McCully's glass houses, Southside, Pittsburgh, which has been idle for two years.

Furnace No. 1 of the Rochester Tumbler Company at Rochester, Pa., which has just been taken down and is now being rebuilt, has been running continually for 52 months. In all that time it has never had its fire out, and has never been stopped for repairs. It is estimated that over 19,000,000 pounds of materials have in that time been melted into glass in this one furnace. The company is rebuilding one of its furnaces, with a capacity for 11 pots, the old one having contained but ten.

The Ravenna (Ohio) Glass Works is running day and night.

The Lenox Glass Works, Massachusetts, are in full blast, and have a prospect of continuing into the winter.

The Dithridge Chimney Company, limited, whose works are located on Seventeenth street, Southside, Pittsburgh, are making an extensive addition to their works which will enable them to double their production, giving employment to 60 shops in the manufacture of lamp chimneys.

The Star Plate Glass Works at New Albany, Ind., have put in operation a new gas furnace, and an additional force of men have been put to work in the window department. If the patent proves successful it will be a great saving of fuel and will add much to the quality of the glass.

B. KREISCHER & SONS,
FIRE BRICK
AND
CLAY RETORT WORKS.
Established 1845.
Office, foot of Houston Street, East River,
NEW YORK.
The largest stock of Fire Brick of all shapes and sizes on hand and made to order at short notice.
Cupola Brick, for McKenzie Patent, and others. Fire Mortar, Ground Brick, Clay and Sand. Superior Kaolin for Rolling Mills and foundries. Stone Ware and other Fire Clay and Sand, from my own mines at New Jersey and Staten Island, by the cargo or otherwise.

NEWTON & CO.,
Successor to
PALMER, NEWTON & CO.,
ALBANY, N. Y., Manufacturers of
FIRE BRICK
Stove Linings,
Range and Heater Linings
Cylinder Brick, &c., &c.

M. D. Valentine & Bro
Manufacturers of
FIRE BRICK
And Furnace Blocks
DRAIN PIPE & LAND TILE.
Woodbridge, - - - N. J.

A. HALL & SONS, Perth Amboy, N. J.
ESTABLISHED 1846.
HALL & SONS, Buffalo, N. Y.
ESTABLISHED 1855.
FIRE BRICK
of reliable quality for all purposes, manufactured o the best New Jersey Fire Clays. Also, Architectura Terra Cotta, Fire Clay, Fire Sand, Kaolin, Ground Fire Brick and Diamantine Building Brick.

Brooklyn Clay Retort
AND
FIRE BRICK WORKS.
Manufacturers of Clay Retorts, Fire Bricks, Ga House and other Tile, Cupola Brick, &c. Dealers in and Miners of Fire Clay and Fire Sand. Clay bank at Burt's Creek, New Jersey. Manufactory: Van Dyke, Elizabeth, Richards and Partition Sts., Brooklyn, N. Y. Office No. 86 Van Dyke St.

Watson Fire Brick Manufactory
ESTABLISHED 1836.
JOHN R. WATSON, Perth Amboy, New Jersey.
Manufacturer of
FIRE BRICK,
For Rolling Mills, Blast Furnaces, Foundries, Gas Works, Lime Kilns, Tanneries, Boiler and Grate Setting, Glass Works, &c.
FIRE CLAYS, FIRE SAND, AND KAOLIN FOR SALE.

HENRY MAURER,
Proprietor of the
Excelsior Fire Brick & Clay Retort Works,
Manufacturer of FIRE BRICK, HOLLOW BRICK AND CLAY RETORTS.
WORKS PERTH AMBOY, NEW JERSEY
Office & Depot: 418 to 422 East 23d St., N. Y

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Troy, N. Y.,
JAMES OSTRANDER & SON,
ESTABLISHED 1848,
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Established 1864.
GARDNER BROTHERS,
MANUFACTURERS OF
STANDARD SAVAGE
Fire Brick, Tile & Furnace Blocks,
OF ALL SHAPES AND SIZES.
Clay Gas Retorts and Retort Settings,
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WORKS: Mt. Savage Junction, Md., and Lockport, Pa

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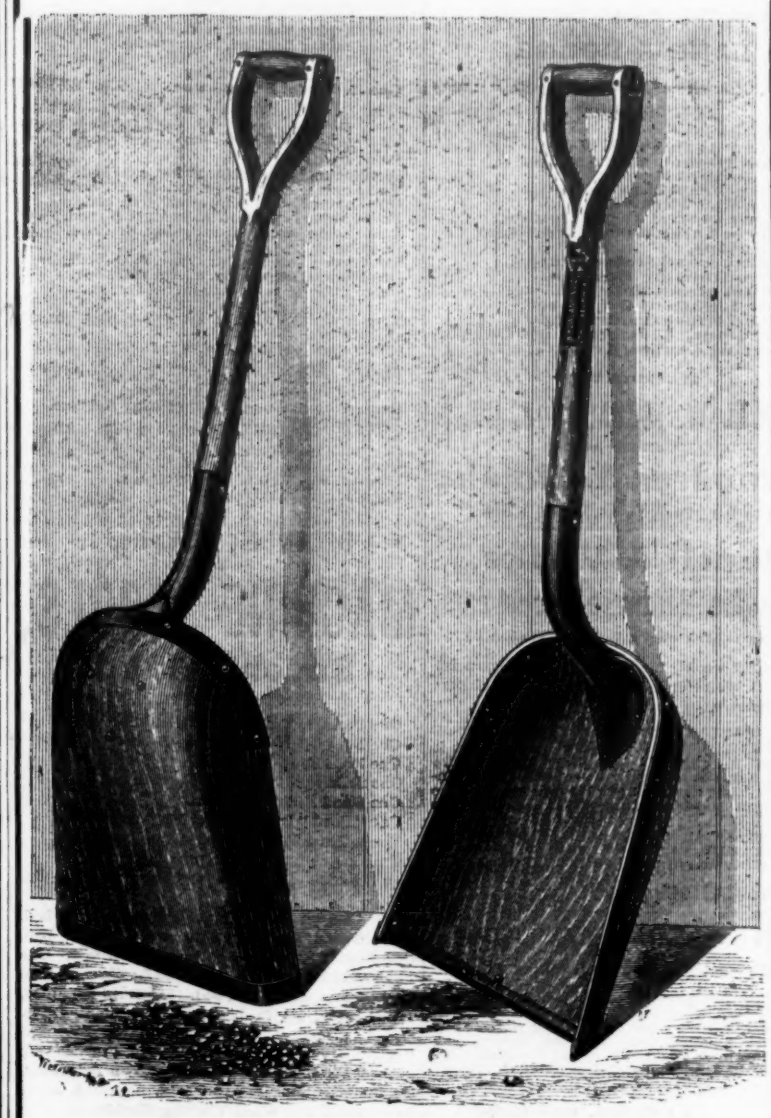
Manufacturers of
Fire Bricks,
Clay Gas Retorts,
Retort Settings,
Tiles, Blocks, &c., &c.
23d St., below Vine,
PHILADELPHIA.
Eighteen years' practical experience.
CYRUS BORGNER. WM. J. O'BRIEN

John Carver,
MANUFACTURER OF
CAULKING IRONS,
Cotton, Freight and Hay Hooks,
No. 288 Monroe Street,
Bet. Jackson & Corlears Sts., NEW YORK.

TACKLE BLOCKS
BURR & CO.,
Manufacturers of Waterman and Russel's
Patent Iron Strapped Blocks.
Also, Manufacturers of
ROPE STRAPPED BLOCKS.
31 Peck Slip, New York.

Trade Mark
B. ROWLAND & CO.,
PHILADELPHIA.



B. Rowland & Co.'s Patent Wooden Blade Grain and Potato Scoop.

We would call the attention of the trade to the above new article of our manufacture, and to its many advantages over the Steel Blade Scoop heretofore used for the same purpose, advantages which we think are destined to make it of universal use for the shoveling of grains of all descriptions, as well as for potatoes, apples, etc.: First, as to its weight, which is a little more than one-half that of a steel scoop of the same capacity, consequently it can be handled more rapidly and accomplish more work in a given time; second, as to its appearance—it is more sightly, being of a graceful shape, and constant use has the effect of giving the wood a beautiful hard polish, causing it to penetrate the mass of grain readily and deliver its load promptly. It balances perfectly in the hands, is thoroughly braced and guarded with iron at all exposed points, and is fully as strong and in some respects more durable than the steel scoop used for the same purpose. One trial will insure its future use to the exclusion of all others.

B. Rowland & Co.
CAST STEEL.
All goods of this brand (which is copyrighted) are warranted in every respect.

B. ROWLAND & CO.,
CITY OFFICE,
27 North Fifth Street, Philadelphia, U. S. A.
Works at Frankford, Phila., U. S. A.
NEW YORK WAREHOUSE, 100 Chambers St.

A New Forge and Hand Blower.

The great variety of conditions under which machinists, blacksmiths, boiler makers, bridge builders and others are forced to operate small forges, has made the demands upon their construction numerous and imperative. They must be light, easily conveyed from one locality to another, compact and durable in construction, and so built that the main working parts are protected when the forge is exposed to the weather. These points, it will be seen, have been carefully considered by the Buffalo Forge Co., an illustration of one of whose forges is given. The legs are made of wrought-iron pipe, and are screwed firmly into cast-iron sockets projecting from the hearth. It is not necessary to fill the hearth with fire-clay to prevent the working parts from getting hot, but it can be done if desired. Each forge has four drop handles attached to the

Fig. 1.—BUFFALO FORGE.

legs, and also an oil-can shelf. The forge is operated by means of a long wooden handle, thus securing a very easy motion and allowing the operator to move about his fire on a radius of 6 feet or more without interrupting the blast. The makers claim to have heated a bar of 2¼ inch round iron to a welding heat in five minutes. To keep a slow fire it is only required to turn the lid of the ash-box which is attached to the fan-case for the purpose of removing the dust and ashes falling through the tuyere, and a sufficient draft is obtained to keep the fire always ready for use during working hours. The chief point of novelty, however, is the hand blower, which, besides its use in forges, is applicable for producing a blast in small cupolas, &c. As may be seen by Fig. 2, the fan is operated by a special gearing, consisting substantially of an internal ratchet and spur wheel, which engages a small pinion fixed to the shaft carrying the large pulley wheel, which, by means of a belt, runs a pulley upon the fan shaft. Suspended from the shaft carrying the ratchet and spur wheel is a swing bar having two pawls engaging the ratchet wheel. This bar is vibrated by the wooden handle pivoted to the standard fixed upon the bed plate. The blower is of an improved fan type, 12 inches in diameter, and is capable of producing a blast sufficient for two or three forge fires. The principal advantages of this hand blower are that it can be operated wherever an ordinary bellows is used, and that it can be placed in any position and occupies only little space. The fan can never be run in the wrong direction to suck the fire and coal gases into the blower, nor can it ever stop upon the dead centers. The forge is also provided with an improved vertical tuyere having a pit to collect the ashes, which can be easily removed by opening a slide.

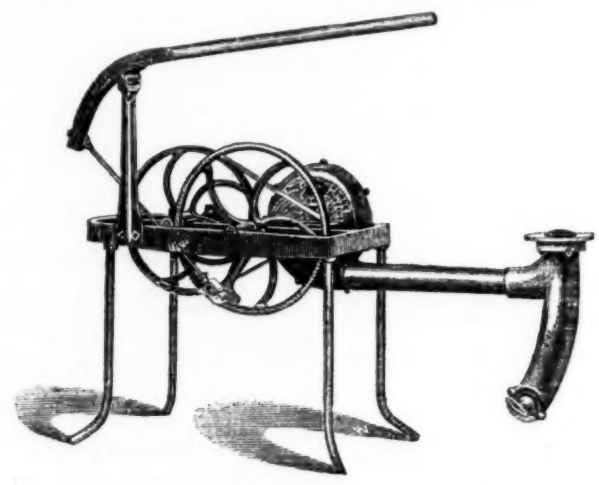


Fig. 2.—HAND FORGE BLOWER AND TUYERE.

The makers, the Buffalo Forge Co., of Buffalo, N. Y., make a number of other shapes of forges for special purposes, the principal improvements being in all cases those mentioned.

The New Rolling Mill of the National Tube Works.—The new rolling mill which the National Tube Works are building at McKeesport, Pa., promises to be the most complete in the country, as it will be one of the most advanced. After considerable careful investigation in England by Mr. Matheson, the superintendent of the company, especially at the Castle Iron Works (Nettlefolds'), it was decided to adopt the Siemens furnace for puddling, and eight double puddling furnaces on this principle will be built. These furnaces are at present at work in Springfield, Ill., but at no other place in the country. The gas producers, twenty in number, are located in an adjoining building. The mill machinery will comprise a 9-ton hammer, a rotary squeezer, a muck train, a universal mill and a continuous mill. The universal train will be 3-high, on the Lauth system, and will have four vertical rolls, two on one side and two on the other of the horizontal rolls. The continuous mill will consist of several pairs of 2-high rolls, one pair front of another, vertical and horizontal rolls alternating. The machinery will be driven by two Porter-Allen variable cut-off engines, built by Messrs. Hewes & Phillips, of Newark, N. J. The main building, which is nearly completed, is a substantial structure covered with corrugated iron. The stacks, two in number, octagon shaped, are now being built, and will be 90 or 100 feet high.

A Scheme for Restricting the Production of Iron.

We understand that the following communication to the *Bulletin of the American Iron and Steel Association* is from Mr. W. H. Ainey, president of the Lehigh Iron Co., Allentown, Pa. We are not prepared to discuss the scheme until we gain from such discussion as may grow out of this letter a clearer idea of how it is proposed to form a combination of producers which shall outlast the temptation to take advantage of the first advance in price, and make iron without reference to the orders of the Board of Control.

To the Secretary of the American Iron and Steel Association.—SIR: The suspension of the Allentown Iron Co., one of the oldest iron companies in the country, indicates the need of some relief from the unparalleled depression which now prevails in the iron business.

You published in 1874 the proceedings of a meeting of the pig iron producers of the United States at Philadelphia. The purpose of that meeting was to effect such an organization as would enable them to do jointly what one person, if the owner of all the furnaces, would do under the same circumstances, namely, limit the production to the demand for consumption. We strongly approved of this movement at the time, and much regretted its failure through a want of co-operation by some of the largest producers. It is believed that if the plan of organization suggested at that meeting had been carried into operation there would have been no money lost in making pig iron. Following is a brief outline of the plan proposed:

It provided for: 1st. A general board of control, composed of representatives from all the pig iron regions, as grouped in the published list of the American Iron and Steel Association; the Lehigh region constituting one, the Schuylkill another, and so on. 2d. A local board for each region. 3d. The producers of each region to be bound to limit the production to the legitimate demand. 4th. When the output in any region exceeded the sales for a given period, the producer making the most iron to his aggregate capacity to first put out a furnace. 5th. A reasonable modification in favor of those producers having only one furnace.

The above, with the necessary details for putting the plan into operation, strikes us as being entirely practical and a common sense means of maintaining the price of pig iron at a living figure. There has been more pig iron made than the market demanded, and as a consequence prices have gone down, down, until they are now several dollars per ton lower than ever before known in this country, and the price still tends downward, though now below the actual cost of production. Like cause will produce like effect, and there is little hope for improvement in prices until some plan be adopted for controlling the output of the furnaces. Such a violation of the laws of trade and of such long continuance could result in nothing else than the deplorable condition which the iron market now exhibits.

Many producers preferred to suffer moderate loss and retain their custom rather than stop and allow other producers to secure their trade; hoping and trusting meanwhile that time would soon bring about a change for the better. And thus from month to month and year to year they have gone on producing more iron than there was a legitimate demand for. We hope the suspension of the Allentown Iron Company will awaken this great interest to the necessity of taking immediate measures for relief. There are able and practical men engaged in the management of these great establishments. It would be an insult to their business intelligence to say that nothing can be done to relieve the situation. Let a proper effort be made now and it can hardly fail of success. But without some limit or control to the quantity of iron to be produced, with half the furnaces idle and anxious to go in, we can see little or no hope for better prices in the near future. PIG IRON MAKER.
LEHIGH VALLEY, Nov. 18, 1878.

The Hinge Manufacturers.—A meeting of the Hinge Manufacturers' Association of the United States and Canada was held in Pittsburgh last week. The following firms were represented: Lewis, Oliver & Phillips, Pittsburgh; Roy & Co., West Troy, N. Y.; Sargent & Co., New York city; Stanley Works, New Britain, Conn.; E. W. Gilmore & Co., North Easton, Mass.; Perrin & Gaff Mfg. Co., Cincinnati; Hagar Bros.

St. Louis; Wheeling Hinge Co., Wheeling; Cowan & Britton, Gananoque, Canada. The convention was called to order at 10 o'clock by the president, Captain A. H. Sweny, of Roy & Co., West Troy, N. Y., and continued in session until a late hour at night. The matters under consideration were the state of the hinge trade, the equalizing of prices and the regulation of production. The outlook for the trade is said to be a good one, prices being firm and apt to advance. The matter of overproduction occupied a great deal of the association's attention, and it was agreed to prepare a schedule to regulate the amount produced. The session concluded at midnight, and the delegates say that the meeting will make the association stronger than ever.

It is a curious fact that there were imported into the United States in the first eight months of 1878 only 75,000,000 pounds of rags; in the same months of 1877 the importations amounted to 104,000,000 pounds. In August, 1878, the importations were less than 7,000,000 pounds, against more than 17,000,000 pounds in August, 1877. Tin peddlers and other gatherers of domestic rags complain that they cannot sell rags at remunerative prices, and the impression prevails among them that heavy purchases of foreign rags account for the low prices and light demand. The figures cited above show that this is a misapprehension. The increasing use of wood pulp as a substitute for rags is the principal cause of the change.

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(Published by the author.)

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The first edition of 1000 copies cost nearly $2.00 per volume, without allowing anything for the labors of the Author. Having electrotype plates of each page, the expense of second edition is much less.

For the purpose of more quickly introducing the work, the publisher proposes, until further notice, to send a copy (Counting-House Edition, price, $3.00), postpaid, to any address on receipt of

ONE DOLLAR.

In due time the price will be advanced so as to afford a moderate profit. **Merchants, Manufacturers, Bookkeepers** and **Clerks** now is your time. Send in your **Dollar** and receive the book by return mail. Don't delay. You can write and mail the order in three minutes or less.

Editorial Notice from the Hartford Daily Courant.
Gen. Joseph R. Hawley's Paper.

A Valuable Business Assistant.

Mr. S. H. Jennings, of Deep River, has prepared a book of discount tables which cannot but prove valuable to accountants and business men generally. The design is to offer by table a way of finding either the **Discount** or **Net** on any amount of dollars and cents, from a penny to a million dollars, at any rate of discount, without multiplication, division, or subtraction. The tables work equally well for simple or compound discount. They enable one to verify invoices, make out bills, &c., without any but mechanical work. No calculation is involved and the possibility of blundering greatly reduced. The book also contains a fine steel plate engraving of the author.

Currency may be sent by **mail** at publisher's risk. Address

S. H. JENNINGS,
Deep River, Conn.

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OF O. A. NATHUSIUS (STOCK and FIXTURES)

FOR SALE,

either entire or in job lots to the trade.

Apply to the Assignee on premises,

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WANTED—A traveler, well acquainted with the Hardware Trade of the Western States, who has traveled for the past 13 or 14 years, expects to be at liberty 1st of January. Has good reasons for leaving present employment, and would like a position with some good manufactory or importer of Cutlery or Hardware.

Address X. Y.,
Office of *The Iron Age*, 83 Reade St., New York.

Valuable Mill Property
AT PUBLIC SALE,

On the Premises, New Brighton, Beaver Co., Pa., on Thursday, January 16th, at 1 p. m.,
Known as the KEYSTONE WOOLLEN MILLS,
Consisting of

One four-story Brick and Stone Building, 85x53, with two-story Stone Attachment; lot 150x150.

One four-story Brick and Stone Building, 66x36, with two one-story Brick Attachments, 32x36 and 66x45.

One four-story Brick Warehouse, 48x27, with small Dwelling and Stable, lot of both being 100x70.

A 30-ft. street runs through both these properties.

Also one-third interest in a three-story Carpenter Shop, lot 60x160 feet.

Ample water-power to each of the mills, which contain four sets of cards, with looms, etc., all in good running order. The property will be divided and sold with or without the machinery.

For fuller description apply to
MILTON TOWNSEND, New Brighton.
RICHARD CADBURY, 225 Chestnut St., Phila.
H. P. BANCROFT, 98 Franklin St., New York.

New Brighton is on the Beaver River, 27 miles from Pittsburgh, on the P., Ft. W. & C. and P. & E. R. R., and is the center of a population of about 15,000.

Wanted, Second-Hand Steam Hammer,

with fifteen hundred to three thousand pounds drop. Apply to

H. B. NEWHALL, 11 Warren St., N. Y.

A GENTLEMAN with twenty-five years' business experience, desires a permanent position where ability, integrity and faithfulness will secure an adequate return. Best of references. Any mountainous region acceptable. Address confidentially, with full particulars, D.,
Care P. O. Box 1333, New York City.

Special Notices.

AUCTION SALE
OF THE
Vulcan Iron Works,
At Richmond, Va.

Will be sold by public auction, at 11 a. m. on Wednesday, December 11th, 1878, all the buildings, machinery, tools, stock, &c., belonging to the firm of Archer, Goodwin & Co., consisting in part of one 45-horse-power engine, boiler, &c., two Lewis' bolt-heading machines, nine bolt cutters, three nut machines, six nut tappers, six nut burring machines, and all the machinery, tools, shafting, pulleys, belts, &c., necessary for a complete factory for the manufacture of bolts, nuts, rivets, washers, &c. A catalogue of the entire stock will be furnished on application to the trustees. Terms of sale: All sums under $100, cash; up to $500, two months' credit; $500 and larger sums, four months' for approved endorsed negotiable paper.

W. GODDIN,
I. C. SINTON,
R. E. BLANKENSHIP, } Trustees.

For Sale,

English and Canadian Patent for best portable forge and blacksmith hand blower in the market. Successfully introduced in the United States. This is a rare opportunity to make a good investment.

Address **C. H.,**
Care of Buffalo Forge Co.,
Buffalo, N. Y.

TO AMERICAN MANUFACTURERS.—The advertiser, having a large wholesale connection with the principal ironmongers, &c., in all large towns in England, Scotland and Ireland, is willing to introduce to the trade **American Manufactures** in horticultural and domestic articles, with his own manufactures.

N. B.—Upward of 50,000 catalogues are circulated throughout Great Britain yearly by the advertiser, and goods are well known.

ALFRED WRINCH,
St. Lawrence Works, Ipswich, England

To Steel Manufacturers.

An energetic young man with scientific training, who has had experience in the manufacture of Bessemer and Crucible Steel, in preference to remaining unemployed would be willing to take a subordinate position with the prospect of being employed as blower in Bessemer or as melter in Siemens-Martin steel works. Highest recommendation as to integrity, character and ability furnished. A correspondence, which shall be strictly confidential, respectfully solicited.

Address **A. I. F.,**
33 West 35th St., New York.

FLOWER PINS.

A new article of light wire, recently patented.

THE ENTIRE PATENT
OFFERED FOR SALE.

For further information address the inventor,

J. H. PLUMMER,
1276 Pacific St., Brooklyn, N. Y.

HARDWARE BUSINESS FOR SALE.

In one of the most thriving towns in Pennsylvania, about 75 miles from Philadelphia, a well selected stock of Hardware of about $15,000, and doing a retail cash business of $75,000, is offered for sale on low and easy terms. Wishing to retire from business reason for selling. Address

K. T. B.,
Office of *The Iron Age*, 220 S. 4th St., Phila., Pa.

HARDWARE AND STOVE BUSINESS
For Sale in Central New York.

Stock will invoice $12,000. Business has increased from $12,000 to $35,000 in three years. Reason for wishing to sell, lack of capital for the steadily increasing trade.

Address **G. J. W.,**
Canastota, N. Y.

Special Notice.

The undersigned offer their services as Agents to makers of **American Cabinet Hardware.**

They keep a full line of UPHOLSTERERS' AND CABINET MAKERS' MATERIALS.

LOUIS WINDMULLER & ROELKER,
20 Reade St., New York.

Address in FRANKFORT-ON-MAIN, GERMANY, ERWIN ROELKER.

Wanted,

A young man to solicit business and travel the greater portion of his time. Must be a good salesman. A person accustomed to the road and with some knowledge of hardware and machinery preferred. Address, with reference,

BUSINESS,
Office of *The Iron Age*, 83 Reade St., N. Y.

HARDWARE BUSINESS FOR SALE

In the finest section of Western New York. A general Hardware business, established in 1849; stock about $5000, well assorted and adapted to the trade; building of brick, 25x100, two stories, and built expressly for the business. The above offers superior inducements to any one about to commence business, and will be sold at a low price.

Apply to *L. Rathbone,* Assignee,
Oakfield, Genesee Co., N. Y.

ROLLING MILL FOREMAN.

Wanted, in an Eastern Mill, a steady, industrious man, to take practical charge of a Forge and Rolling Mill. Must be acquainted with the rolling of all classes of merchant iron. Please state age, where previously employed and references.

Address "IRON,"
Office of *The Iron Age*, 83 Reade Street, N. Y.

FOR SALE—Job Lots and Bankrupt Stocks Hardware. Great bargains offered to the trade.

A. W. WHEELER,
141 Lake Street, CHICAGO, ILLS.

WANTED, a situation by a young man of eleven years' experience with one of the largest hardware houses in New York, a position of any kind in a Hardware Jobbing or Manufacturing house. Address J.,
Office of *The Iron Age*, 83 Reade St., N. Y.

WANTED, by a recent graduate of one of the leading scientific colleges, a position in which a knowledge of the theories taught may be made a vailable. Is a good penman, reads French, and possesses fair literary ability. Address W. R. B., Box 1848, New York.

TO LEASE—A FOUNDRY PROPERTY IN the vicinity of New York, established over 20 years, fully equipped for light or heavy castings, and with a good line of custom work. In addition, the owner will be glad to continue the manufacture of his own goods, in amount equal to one-third the capacity. An experienced person or firm having the control of castings to the amount of two or three hundred tons yearly, would be able to make exceedingly satisfactory arrangements.

Address FOUNDRY PROPERTY,
Office of *The Iron Age*, 83 Reade St., New York.

Special Notices.

Leigh's Tables of
Mercantile Discounts

(5% to 82½% and all the combinations.)

Arranged in three parts:

I. Comparative Discounts.
II. Comparative Net Prices.
III. Computing Tables.

Parts I and II specially adapted to the use of **Buyers and Salesmen.** Part III for **all** who have to **figure** discounts. **No index required.** Discounts can be found and results obtained in the time required to **find the discount** from an index.

Mailed postpaid to any address for $1. Address

EDWARD B. LEIGH,
St. Louis Elevator, St. Louis, Mo.

Or either of the Publishers, viz:
IVISON, BLAKEMAN, TAYLOR & CO., New York.
R. & T. A. ENNIS, St. Louis.

SPECIAL NOTICE.
Cheap Hardware.

Having determined to close out our entire stock of Hardware, as we intend quitting business, we are offering especial inducements regardless of cost. Call and see

LANE & BOONE,
Importers and Jobbers of Hardware,
1227 Market St., Philadelphia.

One 9-inch Train Rolls,
One 16-inch Train Rolls,
Both with Housings.
Two Steam Hammers,
One Pair Shears,
One Lot Steel Ingot Moulds,
Three Large Woodward Steam Pumps,
Three Small Steam Pumps,
Two Hoisting Engines,
Three Steam Boilers,
One Lighthall Condenser,
One Surface Condenser,
Deck Pumps, Low Pressure Gauges, Registering Gauges, &c.,

FOR SALE LOW BY

DANIEL W. RICHARDS & CO.,
Dealers in
Scrap Iron & Metals,
88 to 96 Mangin St., New York.

Bissell & Welles,
Wholesale Hardware Auctioneers,
83 Chambers and 65 Reade Sts., N. Y.

Sales held weekly for the trade. Consignments solicited. We refer to the leading Manufacturers and Importers.

DISSOLUTION OF PARTNERSHIP.—Notice is hereby given that the Partnership heretofore existing between CARL STEPHAN and JAMES EDWARD DENISON, under the name and style of the "American Hardware Company," has been this day DISSOLVED; and all parties indebted to the said company are hereby notified that receipts for payment must bear the signature of the undersigned, otherwise they will not be recognized.

JAMES E. DENISON.
9 William St., Melbourne, 29th August, 1878.

INTERNATIONAL EXHIBITION,
MELBOURNE, AUSTRALIA.

American manufacturers and others who wish to be represented at the International Exhibition, to be held in Melbourne in 1880, are respectfully requested to communicate with the undersigned, who is now making arrangements for personally attending to a limited number of exhibits. Terms, references and full particulars can be obtained on application to

JAMES E. DENISON,
9 William St., Melbourne, Australia.

Dissolution of Partnership.

Notice is hereby given that the partnership heretofore existing between Carl Stephan and James Edward Denison, under the name and style of "American Hardware Company," has been this day dissolved, and all parties indebted to the said company are hereby notified that receipts for payment must bear the signature of the undersigned, otherwise they will not be recognized.

CARL STEPHAN.
9 WILLIAM STREET, MELBOURNE, AUSTRALIA,
Sept. 2, 1878.

To the Manufacturers of the United States:

In referring to the above notice the undersigned has the pleasure of announcing to his friends and the manufacturers of the United States, that he will continue the business as Manufacturers' Agent as heretofore ON HIS OWN ACCOUNT, for the introduction and sale of American Hardware and Merchandise. After eighteen months of colonial experience I am fully prepared to serve and advise manufacturers and others as to the requirements of the colonies, and I shall be happy to correspond with them on the subject. Any business placed in my hands shall have the best attention, and with my knowledge of the trade, both here and in the States, I can guarantee the best result in the introduction and sale of goods.

Thanking my friends for the confidence they have placed in me while connected with the above company, I shall endeavor to merit the same by close attention to the business interests of my patrons and strictly honorable dealing. I shall report to my friends in due time my reasons for dissolving the above firm, and as the liquidation of that concern DOES NOT interfere with my new departure, I beg leave to ask of my friends to continue the correspondence with me as heretofore. I shall guard their interests now in the hands of the late firm at all hazards.

I am, gentlemen, yours respectfully,

CARL STEPHAN.
9 WILLIAM STREET, MELBOURNE, AUSTRALIA,
Sept. 2, 1878.

Australian Agency.

The undersigned manufacturers' agent wishes to form a connection with a FIRST-CLASS HOUSE in New York or Boston to enable him to concentrate his assorted orders offered to him in the general hardware line for execution. A large and safe trade can be done among the better class of wholesale and retail dealers throughout the colonies in American goods of all descriptions. I invite correspondence on the subject.

Address CARL STEPHAN,
Manufacturers' Agent, 9 William Street,
MELBOURNE, AUSTRALIA.

TO MANUFACTURERS & MERCHANTS,—The firm of E. MOLAS & CO., of Madrid, Spain, take charge of all orders for the purchase and sale of any article on commission. They will either purchase goods of Spanish manufacture to ship abroad, or sell in Spain any goods sent to them on consignment. They will accept the agency for any article of American manufacture upon conditions mutually agreeable. The firm having a large connection with dealers in Agricultural Implements, this class of goods will have special attention. For references and further information, address or apply to

MR. A. ECHEVERRIA,
25 Broadway, New York.

Special Notices.

Special Announcement

SECOND-HAND AND NEW TOOLS
FOR SALE.

The Tools in the following list are all of Wood, Lighte & Co.'s make, have been used, but are all in good order and will be sold low:

Five Engine Lathes, 15 in. swing 6 ft. bed.
Six Engine Lathes, 20 in. swing 7½ ft. bed.
Five Engine Lathes, 20 in. swing, 8 ft. bed.
One Engine Lathe, 21 in. swing 6 ft. bed.
One Engine Lathe, 21 in. swing 26 ft. bed.
One Engine Lathe, 24 in. swing 12 ft. bed.
One Engine Lathe, 28 in. swing 12 ft. bed.
One Engine Lathe, 44 in. swing 14 ft. bed.
Two Upright Drills, 27 in. swing, not geared.
One Upright Drill, 22 in. swing, not geared.
One Upright Drill, 32 in. swing, back geared and self feed.
One Planer, 24 in. x 23 in. x 4 ft.
One Planer, 24 in. x 24 in. x 4 ft.
Two Planers, 32 in. x 30 in. x 8 ft.
One Planer, 32 in. x 30 in. x 10 ft.
One Planer, 37 in. x 37 in. x 10 ft.
One Planer, 42 in. x 36 in. x 15 ft.
One Planer, 72 in. x 66 in. x 24 ft.
One Shaping Machine, 11 in. stroke.
One Shaping Machine, 12 in. stroke.
Four Bolt Cutters, various sizes.
Two No. 2 Milling Machines.
One Horizontal Boring Lathe.

The following are all new tools to be sold very low, and are all Wood, Lighte & Co.'s make:

One Engine Lathe, 13 in. swing, 4 ft. bed.
Two Engine Lathes, 13 in. swing, 5 ft. bed.
One Engine Lathe, 13 in. swing, 6 ft. bed.
Four Engine Lathes, 16 in. swing, 6 ft. bed.
Two Engine Lathes, 16 in. swing, 8 ft. bed.
One Engine Lathe, 20 in. swing, 8 ft. bed.
One Engine Lathe, 20 in. swing, 20 ft. bed.
One Engine Lathe, 28 in. swing, 14 ft. bed.
Three Planers, 24 in. x 24 in. x 4 ft.
Two Planers, 24 in. x 24 in. x 6 ft.
Two Upright Drills, 32 in. swing, back geared and Self feed.
One Planer, 36 in. x 36 in. x 12 ft.
Two Shaping Machines 8 in. stroke.
Three Shaping Machines, 11 in. stroke.
One Shaping Machine, 14 in. stroke.
One combined Shaping and Slotting Machine.
Two No. 1 Bolt Cutters.
Seven No. 2 Bolt Cutters.
One No. 3 Bolt Cutter.
One No. 1 Bolt Cutter, with centers.
Five No. 2 Bolt Cutters, with center.
One No. 1 Milling Machine.

DECEMBER LIST, No. 1.

MACHINE TOOLS,
Second-Hand.

One Portable Engine, 6 in. cylinder.
One No. 3 Stiles Geared Press.
One No. 2 Fowler Press.
One Sellers 500 lb. Steam Hammer.
One Hand Milling Machine.
One "Pond" Index Milling Machine.
Three Chase Patent Pipe Cutting Machines.
One Engine Lathe, 16 in. swing, 8 ft. bed.
One Back Geared and Self-Feed Drill, 32 in. swing.
Two Engine Lathes, 13 in. swing, 6 ft. bed.
Two Engine Lathes, 22 in. swing, 8 ft. bed.
One Engine Lathe, 15 in. swing, 6 ft. bed.
One Engine Lathe, 15 in. swing, 7 ft. bed.
Three Engine Lathes, 20 in. swing, 8 ft. bed.
Six Turning Lathes, 14 in. swing, 4½ ft. bed.
Three 4-spindle Drills.
One 8 in. Shaper.
One Gear Cutter.
One new "Hardaway" Bolt Heading Machine, to head up to ⅞ in. bolts.
One new "Hardaway" Bolt Heading Machine to head up to 1¼ in. bolts.
A lot of Saw Tables and Wood Working Machinery.

Please specify which of the above tools you want and we will forward all particulars.

The above tools will be sold very low, and can be seen at

The Geo. Place Machinery Agency,
121 Chambers and 103 Reade Sts.,
NEW YORK.

FOR SALE.—ONE DOUBLE-HEADED LATHE, specially built for turning off the ends of iron columns. Heads are double geared, one head shifting. Swings 3 ft.; shears measure 30 ft. long by 41 in. wide. In prime order, and is a first-class tool. Lately used in Jackson's Excelsior Iron Works. Price, $1000.

One single-head LATHE. Works with a round leather belt. Swings 4 ft.; total length, 30 ft. Out of the Allaire Works. In good order. Price, $650.

One ordinary geared Lathe. Swings 2 ft.; total length, 20 ft. In good order. Price, $250.

One No. 1 Sturtevant Blower for forges. New. Complete. Two (of the eight) arms accidentally broken, but does not affect its working. Price, $20.

Five iron SUSPENSION DRILLERS, with drill tables and all complete. Price, $20 each.

Foundry Cranes, Cupolas, Core Carriages, &c., now in the Excelsior Iron Works.

WM. J. FRYER, JR.,
Ætna Iron Works, 104 Goerck St., N. Y.

FOR SALE.
Job Lots Hardware.

Great inducements to the trade. Two hundred dozen Handled Chopping Axes at a low price.

A. W. WHEELER,
141 Lake St., Chicago, Ill.

A Rare Chance.

FOR SALE—An established **Hardware Business** of 15 years' standing, in a Western city. Location unexcelled. Capital required, $6000; prefer the cash, but instead will take part in live stock (cattle or sheep). Best of reasons for selling. For further particulars address

HARDWARE, Box 44,
Office of *The Iron Age*, 83 Reade St., N. Y.

WANTED.—A German, at present engineer at one of the largest iron works of Germany, Eisenhuette, Gutehoffnungshuette, Oberhausen, seeks an engagement in this country. He has a thorough practical and theoretical experience in the management of blast furnaces, foundries and coke works, and has acquired a thorough knowledge of metallurgical chemistry, being a graduate of the Royal Academy of Berlin. He wishes specially to form an engagement with an establishment where his invention of a new process of eliminating phosphorus from iron and steel, recently patented in this country, would be put to a practical test. Address P. S. BERGE,
P. O. Box 4550, New York.

Wanted,

A well-established Hardware Business in some flourishing place on railroad west of the Mississippi River. State amount of stock, annual sales, population, &c. Address L.,
Office of *The Iron Age*, 83 Reade St., N. Y.

Special Notices.

Second-Hand Machinery For Sale Low.
SEND FOR LIST.

Engine Lathe, built by Seth Wilmarth, 8 in. swing, 23 ft. bed live spindle hollow, face plate both ends, one at front 6 ft. 4 in. diameter, one at rear 7 ft. 1¾ in. diameter, two boring bars traversed by tail spindle, both arranged for splining key ways; one of these bars is designed for work on rear face plate and has yoke to support outer end; on either face plate work may be bored, turned and splined without removing the fastenings. At rear face plate an adjustable bed 11 feet long, carrying an adjustable tool rest, the latter having 3 ft. 6 in. traverse, arranged to cut at any angle and in any position on above bed. Tail spindle is 5¾ in. square, carriage is fed by a screw the full length of bed, cross feed automatic, 6 grades of feed to operate either, 10 grades of speed for live spindle, driving movement gears direct to front face plate, complete with counter-shaft for driving, splining and feeding. One large saddle or center rest.

Planer, built by W. Collier & Co., Salford, Eng., planes 54 in. wide, 48 in. high, 18 ft. long, automatic cross, vertical and angular feed, platen driven by gearing into step rack, return motion about 3 to 1; has third upright with vertical tool slider, automatic feed, to plane work that will not pass between the regular uprights. This slider has a vertical movement of 5 ft. 4 in. Countershaft.

HOLYOKE MACHINE CO.,
Holyoke, Mass.

The Sherman Process Co.

9 Pemberton Square, Boston, Mass.,

Issue Licenses to use the Process for the Manufacture of Iron and Steel

In the Bessemer Converter, Crucible, Siemens-Martin, Puddling, Blast and Cupola Furnaces.

The use of this Process improves the quality of the product, saves fuel and labor, and does not require any change in furnace or manner of working.

See page 17 of *The Iron Age* of Oct. 25th, 1877.

Wanted—A Partner,

In a foundry and machine business, already well established. Locality splendid and healthy.

A practical man with means is wanted to join a practical man who is already well established.

Address *CAR WHEEL FOUNDRY,*
P. O. Box 134, Selma, Alabama.

To Manufacturers and Jobbers of Hardware, Cutlery, &c.

Manufacturers and Jobbers, having surplus stocks or goods that from any cause are unsaleable upon which they wish to realize, or assignees who have stocks to dispose of, will find a cash purchaser by communicating with.

W. M. CALDWELL,
Dealer in
Job and Auction Lots of Hardware, Cutlery, &c.,
102 Chambers St., New York.

Price Books.

Large Size, Full Leather.....$12.00
" " Half " 10.00
Pocket " Full " 5.00

Send for circular.

BUELL LAMBERSON,
No. 97 Chambers Street, - New York.

These books may also be had at publishers' prices of WM. BLAIR & CO., Chicago,
A. F. SHAPLEIGH & CO., St. Louis, and
R. W. BOOTH & CO., Cincinnati, O.

Foreign Houses

importing American Goods, and desiring the services of a reliable Agent at a moderate commission to attend to all their business in the United States, are invited to correspond (in English) with the undersigned.

Has had three years' experience as purchasing agent for Messrs. Wm. Marples & Sons, Sheffield and London, England.

Address **S. H. JENNINGS,**
Deep River, Conn., U. S. A.

J. H. JENKS & CO.,
Manufacturing Machinists
180 Centre Street, New York,

are prepared, with a superior equipment of first-class tools and experienced mechanics, to contract for the *designing* and *construction* of special TOOLS, DIES, JIGS and GAUGES for duplicating interchangeable parts of fine machinery or sheet metal goods. Contracts for manufacturing staple goods in quantity solicited.

CALIFORNIAN AGENCY.

A San Francisco firm of File and Tool makers, having an agent constantly traveling among the consumers in the State and West Coast, is desirous of representing some first-class Eastern Houses in the manufacturing hardware trade.

Address **AGENCY, 248 Beale St.,**
San Francisco, Cal.

SECOND-HAND MACHINE TOOLS.

28 in. x 60 in. Corliss Engine; 10 in. x 24 in. Harris Corliss, with Vertical Boiler Heater and Pump, all new; 14 in. x 30 in. Whitehill & Smith Adj. Cut-off Engine; 10 in. x 24 in. Fishkill Landing Engine; one 45 h. p. Hor. Tub. Boiler. Engine Lathes as follows: 30 in. x 12 ft., 24 in. x 24 ft. Pond, nearly new, late pattern; four 16 in. x 6 ft. Ames Mfg. Co., nearly new; one 13 in. x 4 ft., Pratt & Whitney Taper Attach. Lincoln 48-in. Gear Cutter. One 13 in. x 4 ft. P. & W. Lathe; one 20 in. x 10 ft. Ferris & Miles, nearly new. One 22 in. x 7 ft. Whitcomb Planer; one 28 in. x 7 ft. Planer. One 30 in. x 7 ft. Planer, new. One 16 in. x 3 ft. P. & W. Planer. One Crank Planer. Two Profile Mch. One Mason Milling Mch. Four Brainard Millers, Seven Lincoln Pattern Millers. One each 2, 3 and 4 Spindle P. & W. Drills. One 8 in. Slotting Mch. One No. 6 Wilder Punch. One No. 2 and No. 4 Styles Press. One Schlenker Bolt Cutter, new. One Sellers Bolt Cutter.

E. P. BULLARD, 14 Dey St., New York.

Bookkeeper or Salesman.

A young man, age 26, for five years with one house, desires a position as bookkeeper or salesman. Is competent to take entire charge of books. Has had experience on the road. References unquestionable. Address N. A. W.,
Office of *The Iron Age*, 83 Reade St., N. Y.

TO IRON, STEEL OR HARDWARE MANUFACTURERS.

The undersigned, having been thrown out of employment by the failure of the firm he has been connected with for several years, solicits the correspondence of any house in above line needing the services of a trustworthy man. Is a thorough bookkeeper and familiar with all details of office work. Has also been on the road.

Address **HENRY CLIFFORD,**
Office of *The Iron Age*, 83 Reade St., New York.

Trade Report.

Office of THE IRON AGE,
WEDNESDAY EVENING, Dec. 4, 1878.

The events of the past week in the financial markets have been unimportant, with the exception of a speculation in gold, which advanced the premium to 100½. The money market continues easy, with 2 % @ 3 % as the rate to borrowers on call, and 4 % @ 5 % discount on prime mercantile paper. The meeting of Congress has had no perceptible effect upon the financial markets. It is generally understood that there will be no measures introduced which are intended to obstruct the Secretary of the Treasury in carrying out the scheme of resumption provided for by law. The scheme which proposes making trade dollars legal tender is so obviously a "job" in the worst sense, that it is not likely to receive the favorable consideration of Congress or the approval of the President, should it pass. There is nothing of especial nterest to report as regards general trade.

Gold to-day is 100¼ without fluctuations. Government bonds are strong and higher, as are also desirable investment securities generally. We give below the closing quotations of governments.

In the stock market there has been some speculative activity, causing an alternation of strength and weakness, without important fluctuations. The principal dealings have been in St. Paul, Northwest, Lake Shore, D. L. & W., and Western Union. We give below the closing quotations of active shares:

The bank return shows an increase of $337,400 in surplus reserve, which now stands as $12,543,800, against $9,663,425 at this time last year, and $8,477,300 at the corresponding period in 1876. The loans show an increase this week of $1,520,700; the specie is down $447,000; the legal tenders are increased $687,500; the deposits are down $387,600, and the circulation is increased $45,100.

The following is an analysis of the bank totals of this week compared with that of last week:

	Nov. 23.	Nov. 30.	Comparisons.
Loans	$234,917,700	$236,438,400	Inc. $1,520,700
Specie	23,414,400	22,967,400	Dec. 447,000
Legal t'nd'rs	40,588,200	41,275,700	Inc. 687,500
Tot. reserve.	64,002,600	64,243,100	Inc. 240,500
Deposits	207,184,800	206,797,200	Dec. 387,600
Reserve required	51,796,200	51,699,300	Dec. 96,900
Surplus	12,206,400	12,543,800	Inc. 337,400
Circulation.	19,961,900	20,007,000	Inc. 45,100

The foreign trade movements are shown in the following tables:

IMPORTS.

For week ended Nov. 30:

	1876.	1877.	1878.
Total for week.	$3,401,541	$5,432,058	$5,748,683
Prev. reported.	258,409,347	291,627,021	258,164,806
Since Jan. 1	$261,810,888	$297,059,079	$263,913,489

Included in the imports of general merchandise were articles valued as follows:

	Quantity.	Value.
Anvils	93	$554
Brass goods	9	965
Bronzes	25	3,369
Chains and anchors	19	1,064
Copper	.	187
Cutlery	57	18,011
Guns	51	9,979
Gas fixtures	1	883
Hardware	6	494
Iron, sheet, tons	7	555
Iron cotton ties	3,730	3,280
Iron, ore, tons	1,004	2,181
Iron, other, tons	599	17,004
Metal goods	92	9,600
Nails	2	200
Needles	21	8,719
Old metal		1,229
Platina	2	3,943
Plated ware	1	383
Per. caps	23	3,142
Saddlery	19	2,917
Steel	1,027	11,607
Silverware	5	363
Tin, bxs	21,857	93,162
Tin, slabs	498	7,710
Wire	59	3,237

EXPORTS, EXCLUSIVE OF SPECIE.

For week ended Dec. 3:

	1876.	1877.	1878.
For the week	$6,934,616	$6,869,561	$7,195,710
Prev. reported	242,487,022	263,776,583	314,166,184
Since Jan. 1	$249,421,638	$270,646,144	$321,361,894

EXPORTS OF SPECIE.

For week ended Nov. 30:

Total for the week	$190,408
Previously reported	11,533,494
Total since Jan. 1, 1878	$11,723,902
Same time in 1877	24,521,678
Same time in 1876	42,537,323
Same time in 1875	69,450,102
Same time in 1874	50,884,201
Same time in 1873	46,612,696
Same time in 1872	67,561,750

Government bonds close firm at the following quotations:

	Bid.	Asked.
U. S. Currency 6's*	119½	...
U. S. 6's 1881 registered*	106½	106¼
U. S. 6's 1881 coupon	109	109½
U. S. 6's 1865 new reg*	100¼	100¾
U. S. 6's 1865 cou	103½	103¾
U. S. 6's 1867 reg*	103	103⅛
U. S. 6's 1867 cou	105⅞	106
U. S. 6's 1868 reg*	106¼	...
U. S. 6's 1868 cou	109½	...
U. S. 10-40 reg	107½	107¼
U. S. 10-40 coupon	107½	107¾
U. S. 5's 1881 registered	106¼	106⅜
U. S. 5's 1881 coupon	106⅛	106⅜
U. S. 4½'s 1891 registered	104	104⅛
U. S. 4½'s 1891 coupon	104	104¼
U. S. 4's 1907 registered	99½	99½
U. S. 4's 1907 coupon	100¼	100½

* Ex coupon.

The following were the closing quotations of active shares:

	Bid.	Asked.
Atlantic and Pacific Telegraph	28	28¾
Chicago and Northwest	47⅝	47¾
" " Pref	76⅞	76⅞
Chicago, Rock Island and Pacific	118½	118¼
Chicago, Bur. and Quincy	110½	110¾
Col., Chicago and Ind. Central	6¼	6¼
Clev., Col., Cin. and Ind	31¼	32
Cleveland and Pittsburgh	83	83⅜
Chicago and Alton	78¼	79½
" " Pref	102	...
Canton	21	23½
Delaware, Lack. and Western	46⅜	46¾
Delaware and Hudson Canal	36½	36¾
Express—Adams	106½	107¾
" American	49½	50
" United States	47	47¾
" Wells, Fargo & Co	98½	99
Erie	18⅞	18¼
Harlem	140	143
Hannibal and St. Joseph	14⅛	14¼
" " Pref	33	35½
Illinois Central	76	76¾
Kansas Pacific	11⅛	11⅞
Kansas and Texas	6⅞	7⅛
Lake Shore	68⅞	69
Michigan Central	68¾	69¼
Morris and Essex	79⅝	80
Milwaukee and St. Paul	35¼	35⅞
" " Pref	72¾	73⅛
New York Central	111¾	112
New Jersey Central	28¾	29
Ohio and Mississippi	7⅛	7⅜
" " Pref	15	15
Pacific Mail	13⅞	14⅛
Panama	121	123
Quicksilver	10½	11⅛
" " Pref	33¼	36
St. Louis and Iron Mountain	14	15
St. Louis Kansas City Northern	6¾	6⅞
" " " Pref	25¼	25⅜
Union Pacific	65⅛	65¾
Western Union Telegraph	94⅞	94¾
Wabash	20¾	20⅞

GENERAL HARDWARE.

Those who expected that midwinter dullness would be a conspicuous feature in the General Hardware business of the last month of the year are, judging from the satisfactory trade which the first four days of December has developed, in a fair way toward a pleasant disappointment. Without anything like general activity—a state of affairs entirely unwarranted by the season—there is a demand for goods from nearly every section of the country that gives evidence not only of vitality, but of a growing confidence and conviction that prices have reached a point so low that further shrinkage of values is extremely improbable. There is, too, a marked tendency toward more remunerative prices especially noticeable in those lines of goods the values of which have been for a long time demoralized, a condition of affairs alike unsatisfactory to the manufacturer and dealer, and of little or no benefit to anyone.

It is worthy of remark that the only changes in prices of Hardware which have come to our notice since we last went to press have been on the side of enhanced values, and it is not necessary on our part to make any comments on the absolute necessity which existed for such action on the part of the manufacturers; we only hope that in other lines of goods the prices of which are unsatisfactory all round, the manufacturers will show the same good sense, and place them before the commencement of the new year on a sound business basis—at least solid enough to pay a reasonable profit on investments.

By agreement among the active Screw manufacturers the working hours from the 1st of January next will be reduced to eight hours per day, and in addition the American Screw Co. will have one large mill entirely idle. This state of affairs is brought about by the very low prices ruling consequent on overproduction and the reasonable desire to put the business on a basis that will return a new dollar for an old one. The manufacturers have also issued circulars under date of 4th inst., in which they quote Flat Head Iron, discount 60 per cent.; Flat Head Brass and Round Head Iron, discount 45 per cent., and Round Head Brass, discount 30 per cent. In this connection the following will be of interest: From 1856 down to the commencement of the war, with a slight exception, the price of 1-inch No. 11 Wood Screws did not fall below 28 cents, equal to discount 30 per cent. Subsequently the price advanced to over 50 cents. The present discount of 60 per cent. brings the price down to 16 cents, net, showing an immense reduction from ante-war prices.

We have received the following circulars:

[*Circular No.* 17.]

SCREWS.

Our circular No. 16, dated Oct. 26, 1878, is hereby annulled. Until further notice, our discounts and terms for Wood Screws will be as follows, viz.:

	Per cent. discount.
Flat Head Bright Iron	60
Flat Head Brass	45
Round Head Iron	45
Round Head Brass	30

Cash 30 days from date of invoice. No prices guaranteed.

We are also making the following varieties, for which we solicit orders:

Iron Screws.—Flat Head, Blued; Flat Head, Japanned; Flat Head, Bronzed; Flat Head, Plated; Round Head, Blued; Round Head, Nickel-Plated.

Brass Screws.—Flat Head, Bronzed; Flat Head, Plated; Round Head, Bronzed; Round Head, Plated.

All Plated Screws will be furnished either Nickel or Silver-Plated as ordered. We challenge comparisons as to quality and finish, and tests as to strength. We shall continue to fill orders as heretofore, at prices ruling at date of shipment.

RUSSELL & ERWIN MFG. CO.
NEW BRITAIN, CONN., Dec. 4, 1878.

[*No.* 17.]

PROVIDENCE, December 4, 1878.

To the Hardware Trade: Until further advised we quote you the following discounts and terms on our new patent Wood Screws:

	Dis. from List.
Flat Head Iron	60 P cent.
Flat Head Brass	45 "
Round Head Iron	45 "
Round Head Brass	30 "

Cash thirty days from date of invoice. All orders received subject to rates ruling when executed. Payments in funds at par in Boston, New York, Philadelphia or Baltimore. Very respectfully yours,

AMERICAN SCREW COMPANY.

George W. Bruce, No. 1 Platt street, (Atlantic Screw Works) has adopted the revised prices for Wood Screws.

The manufacturers of Augers and Bits held a meeting at the Astor House in this city to-day, which was largely attended. It was decided to abolish the manufacture of all second quality goods. The discount for the ensuing season, and which went into effect to-day, was fixed at 50 @ 50 and 10 per cent., according to quantity. This is an advance over the minimum prices at which these goods have been sold during the past season.

The demand for Nails has tapered off to small proportions. Prices here are remarkably firm at the low rates which have been ruling, and we hear of no efforts being made to force trade by offers of concessions. From Pittsburgh we are informed of a meeting of the Western Nail Association, held there to-day, which was largely attended. The price of 10d. to 60d. was advanced to $2.15, with an allowance of 10 cents per keg on 200-keg lots, and 2 per cent. discount for cash. There is no change to report in price so far as this market is concerned, and we continue to quote 10d. to 60d., $2.10 @ $2.15, net, according to quantity.

We have received the following circular:

READING, PA., Nov. 29, 1878.

To Manufacturers of Bolts, Nuts and Washers—GENTLEMEN: A meeting of the Association of Bolt and Nut Manufacturers will be held in New York, at the St. Nicholas Hotel, on Thursday, Dec. 12th next, at 10 o'clock a. m., at which your presence is respectfully invited.

The object is for consultation and for business in general. A thorough revision of all our lists will be proposed.

This call is issued in compliance with the expressed wishes of several manufacturers, recently addressed to our secretary in response to his circular letter of the 11th inst.

Your obedient servant,
J. H. STERNBERGH, President.

W. C. Burkinshaw, No. 26 Cliff street, agent for Harrison Brothers & Howson, Sheffield, has issued a circular to the trade, under date of 30th ultimo, in regard to seasonable goods, from which we extract the following:

"We beg to solicit your inspection of an assortment of goods suitable for Christmas trade. Among them may be found Ivory-handle Table and Dessert Knives and Carvers, Pearl-handle Dinner and Fruit Knives, Stag-handle Meat and Game Carvers, Nutpicks, Nutcracks, Grape Scissors, Razors, Scissors, Pen and Pocket Knives, together with a large variety of fine Cutlery in cases, Tea Trays, Fish Carvers, &c., suitable for the season. Although we only carry a small stock in the United States we have, in order to meet the convenience of our customers and the uncertain condition of business, got out the above goods so that no delay may arise to such of our friends as have not given their regular importation orders."

In regular goods suited to the requirements of the Hardware trade they show a fine assortment of Table Cutlery in Ivory, Stag, Celluloid, Black Rubber and Scale Tangs, and good lines of Butcher, Bread and Kitchen Knives, and kindred articles.

Attention is invited to the advertisement of S. H. Jennings on the opposite page, in which he offers until further notice to send his discount tables postpaid on receipt of $1.

The Reading Hardware Co., Reading, Pa., have received a communication from Paris under date of the 13th ult., announcing the pleasant intelligence that their exhibit at the Exposition Universelle was awarded a bronze medal, and in addition a certificate of honorable mention.

Ezra F. Landis, Lancaster, Pa., manufacturer of the "Eclipse" Fan Blower, Tire Benders, Scandinavian Pad Locks and other specialties, is desirous of establishing agencies for the extension of his trade in the home and foreign markets. We invite attention to his advertisement which appears on the 26th page.

Among "Special Notices," on the opposite page, will be found the announcement of public sale of valuable mill property at New Brighton, Beaver county, Pa., on Thursday, January 16, 1879, at 1 p. m. The property, which is known as the Keystone Woolen Mills, is fully described in the advertisement referred to, and to which we invite the attention of manufacturers.

The Stamped Ware Manufacturers' Association was reorganized at a meeting held in the latter part of November, and a commitee on prices was appointed, who submitted for the approval of the association an entire new list for both Deep and Common Stamped Ware. This list has been favorably received, and is already adopted by a majority of the manufacturers of these goods, and as the prices are very low indeed, it is confidently expected that they will become the standard rates for the entire trade. We print below the revised list, which is issued under date of 1st inst., and is subject to a uniform discount of 25 per cent. and the following terms:

"Prompt cash in 30 days. If paid within ten days from date of invoice 2 per cent. will be allowed."

DECEMBER 1, 1878.

DEEP STAMPED WARE.

Discount, Twenty-five per cent.

Biscuit Pans, Retinned.

Nos.	0	1	0½	1½
Per doz.	$3.30	3.60	4.80	5.40

Bread Pans, Handled, Retinned.

Nos.	5	10	15	20	30
Per doz.	$1.50	1.70	1.95	2.25	2.55
Nos.	40	50	60	80	100
Per doz.	$3.05	3.40	3.80	4.65	5.05

Cake Pans, Tubed, Retinned.

Nos.	31	32	33	34	35	36
Per doz.	$1.05	1.60	1.80	2.25	2.50	2.80

Cake Pans, Tubed, Retinned.

Nos.	41	42	43	44	45	46
Per doz.	$1.80	2.30	2.60	3.10	3.50	3.85

Colanders, Retinned (with feet loose).

Nos.	103	104	205	306	407
Per doz.	$1.75	2.10	2.40	2.75	3.30

Feet fast, 15 cents per doz. extra.

Cups, Retinned.

Nos.	7	8	9	10	11	12
Per doz.	$0.75	.80	.90	1.05	1.20	1.35
Nos.	08	09	010	011	012	
Per doz.	$0.75	.85	.95	1.10	1.20	
Nos.	14	15	16	17		
Per doz.	$0.85	.95	1.10	1.20		

Corn Cake Pans, Retinned.

No. 7, per doz., $5.75; No. 7½, per doz. $8.25

Cookey Pans, Retinned.

No. 9, per doz., $3; No. 9½, per doz. $4.50

Cake Turners, Retinned.

Nos.	13	14	15	16	17	18
Per doz.	$0.75	.90	.75	.90	1.00	1.20

Cup Dippers, Retinned.

Nos.	8	9	10	11	12
Per doz.	$1.20	1.35	1.50	1.65	1.80
Nos.	14	15	16	17	18
Per doz.	$1.20	1.35	1.50	1.65	1.80
Nos.	20	21	22	23	24
Per doz.	$1.50	1.65	1.80	1.95	2.10

Dippers, Flaring, Patent Threaded Handles, Retinned.

Nos.	116	117	118	119
Per doz.	$1.65	1.80	1.95	2.10

Dippers, Flaring, Flat Handle, Retinned.

Nos.	110	111	112	113
Per doz.	$1.65	1.80	1.95	2.10

Dippers, Flaring, Wooden Handle, Retinned.

Nos.	122	123	124	125
Per doz.	$1.95	2.10	2.25	2.40

Dippers, Forged Handle, Retinned.

Nos.				100	101
Per doz.				$0.85	1.00

Dippers, Cream, Retinned.—No. 7, 45 cents per doz.

Dippers, Plain.

Pint	½	¾	1	1½	Quart	1	2	2½
Pr. dz.	$0.60	.70	.75	.85	Pr. dz.	$0.95	1.15	1.35

Dippers, Retinned.

Pint	½	¾	1	1½	Quart	1	2	2½
Pr. dz.	$0.75	.85	.90	1.05	Pr. dz.	$1.15	1.35	1.65

Dipper Bowls, Plain,

Pint	½	¾	1	1½	Quart	1	2	2½
Pr. dz.	$0.35	.40	.45	.55	Pr. dz.	$0.60	.75	1.00

Dipper Bowls, Retinned.

Pint	½	¾	1	1½	Quart	1	2	2½
Pr. dz.	$0.50	.60	.65	.75	Pr. dz.	$0.85	1.05	1.30

Dipper Handles.

½ & ¾ pt.	1 pt.	1½ pt. & 1 qt.	2 & 2½ qt.
Per doz. $0.18	.20	.22	.25

Dish Pans, Retinned, Deep.

Quart	7	8	10	14
Light, per doz			$6.00	7.25
Ex. Heavy, per doz	$4.90	5.25	6.65	8.45
Quart	17	22	30	
Light, per doz	$8.25	9.75		
Ex. Heavy, per doz	9.75	11.20	18.00	

Gravy Strainers, Retinned.

Nos.	26	27	28	29
Per doz.	$1.55	1.65	1.85	2.10

Gravy Strainers, Retinned.

Nos.	5	6	16	17	18
Per doz.	$0.80	.85	2.30	1.45	1.65
Nos.	19	36	37	38	39
Per doz.	$1.95	1.25	1.40	1.60	1.85

Ladles, Iron Handles, Retinned.

Nos.	1	2	3	4
Plain, per doz.	$0.75	.85	.90	1.05
Pierced, "	.80	.90	.95	1.10
Nos.	8	9	10	11	12	13
Plain, per doz.	.90	1.00	1.10	1.20	1.35	1.50
Pierced, per doz.	$0.95	1.05	1.15	1.25	1.40	1.55

Ladles, Patent Threaded Handles, Retinned.

Nos.	14	15	16	17	18	19
Plain, per doz.	$0.90	1.00	1.10	1.20	1.35	1.50
Pierced, "	.95	1.05	1.15	1.25	1.40	1.55

Ladles, Wood Handles, Retinned.

Nos.	01	02	03	04
Plain, per doz.	$1.05	1.15	1.20	1.35
Pierced, "	1.10	1.20	1.25	1.40
Nos.	20	21	22	23	24	25
Plain, per doz.	$1.25	1.35	1.45	1.60	1.75	1.90
Pierced, "	1.70	1.40	1.50	1.65	1.80	1.95

Ladles, Wood Handles, Soup, Retinned.

No. 29, per doz., $1.25; No. 30, per doz. $1.40

Ladles, Soup, Forged Handles, Retinned.

Nos.	138	139	140	141
Per doz.	$0.60	.70	.80	.90

Ladles, Soup, Patent Threaded Handles, Retinned.

No. 38, per doz., $1.00; No. 39, per doz. $1.15

Ladles, Pump, Retinned.

Nos.	10	11	12	13
Per doz.	$0.90	1.00	1.15	1.30

	Strong.	Extra Strong.
Nos.	13	10 12
Per doz.	$1.65	1.80 2.95

Ladles, Oyster, Plain, Retinned.

No. 50, per doz. $0.60

Ladles, Oyster, Pierced, Retinned.

No. 55, per doz. $0.65

Molds, Tubed Cake, Retinned.

Nos.	52	53	54
Per doz.	$2.30	2.60	3.00

Molds, Patent, Octagon, Retinned.

Nos.	73	74	75	76
Per doz.	$2.80	3.05	3.40	3.85

Molds, Patent, Turban, Retinned.

Nos.	86	87	88	89
Per doz.	$2.70	3.05	3.40	3.85

Molds, Patent, Turk's Heads, Retinned.

Nos.	61	62	63	64
Per doz.	$3.50	4.50	5.50	6.75

Dairy Pans, Plain, Flat Edge.

Quart	¾	½	1	1½	2
I. C., per doz.	$0.40	.45	.60	.70	.80
Quart	3	3½	4	5	6
I. C., per doz.	$1.00	1.15	1.30	1.40	1.50

Milk Pans, Plain, Flat Edge.

Quart	¾	½	1	1½	2	3	3½
1 X, per doz.	$0.45	.55	.70	.75	.90	1.15	1.30
Quarts	4	5	5	8	10	12	
1 X, per doz.	$1.50	1.75	1.90	2.20	2.40	2.80	
1 XX, "				2.80	3.00	3.55	

Dairy Pans, Retinned, Flat Edge.

Quart	¾	½	1	1½	2
I. C., per doz.	$0.55	.70	.90	1.00	1.10
Quart	3	3½	4	5	6
I. C., per doz.	$1.30	1.50	1.65	1.80	1.95

Milk Pans, Retinned, Flat Edge.

Quart	¾	½	1	1½	2	3	3¾
1 X, per doz.	$0.60	.75	1.00	1.05	1.20	1.45	1.65
Quart	4	5	6	8	10	12	
1 X, per doz.	$1.50	2.00	2.35	2.75	3.00	3.40	
1 XX, "				3.40	3.60	4.30	

Pudding Pans, Extra Deep, Retinned, Heavy.

Quart	½	1	1½	2	3
1XX, per doz.	$1.25	1.45	1.70	1.95	2.25
Quart	4	5	6	8	10
1XX, per doz.	$2.75	3.05	3.45	4.25	4.60

Pudding Pans, Extra Deep, Retinned, Light.

Quart	½	1	1½	2
1 X, per doz.	$1.10	1.25	1.45	1.65
Quart	3	4	5	6
1 X, per doz.	$1.90	2.20	2.55	2.75

Pudding Pans, Extra Deep, Plain, Light.

Quart	½	1	1½	2
1 X, per doz.	$0.80	.95	1.15	1.25
Quart	3	4	5	6
1 X	$1.50	1.75	2.00	2.25

Muffin Pans, Retinned.

Nos.	4	5	4½	5½
Per doz.	$3.60	4.50	5.40	6.60

Milk Strainers, Retinned.

Nos.	210	21	22
Per doz.	$2.35	2.50	2 90

Preserving Kettles, Deep, Retinned.

Nos.	16	18	20	22	24
Per doz.	$3.50	4.00	4.60	5.15	5.65
Nos.	26	28	30	32	36
Per doz.	$6.30	7.10	7.95	8.65	9.90

Preserving Kettles, Shallow, Retinned.

Nos.	016	018	020	022
Per doz.	$2.50	2.75	3.15	3.55
Nos.	024	026	028	030
Per doz.	$3.95	4.35	4.95	5 40

Preserving Kettles, Lipped, Retinned.

Nos.	160	180	200	220	240
Per doz.	$2.55	2.70	3.00	3.75	4.10
Nos.	260	280	300	320	
Per doz.	$4.90	5.30	5.85	6.25	

Pudding Pans, Oval, Retinned.

Nos.	1	2	3	4
Per doz.	$2.00	2.25	2.75	3.25

Rinsing Pans, Retinned, 1 X.

Nos.	7	8	10	14	17
Per doz.	$4.35	4.75	5.00	6.00	7.00

Stew Pans, Shallow, Retinned.

Nos.	1	2	3	4	5
Per doz.	$1.00	1.25	1.50	2.00	2.25
Nos.	6	7	8	10	
Per doz.	$2.75	3.15	3.50	4.85	

Stew Pans, Deep, Retinned.

Nos.	16	18	20	22
Per doz.	$2.45	2.80	3.20	3.60
Nos.	24	26	28	30
Per doz.	$4.00	4.45	5.15	5.65

Scoops, Retinned.

Nos.	34	35	36	37	38	39
Per doz.	$0.65	.85	1.00	1.15	1.35	1.45
Nos.	12	14	16	7	8	9	10
Per doz.	$0.70	.80	.95	2.00	2.50	3.00	4.00

Scoops, Retinned.

Nos.	20	30	40	50
Per doz.	$2.75	3.95	4.00	5.25

Nos.	2	3	4	5
Per doz.	$2.00	2.50	3.00	4.00
Nos.	70	80	90	100
Per doz.	$2.75	3.25	4.00	5.25

Sauce Pans, Strong, Lipped, Retinned.

Nos.	9	10	12	14	16	18
Per doz.	$1.10	1.30	1.95	2.40	2.75	3.15
Nos.	20	22	24	26	28	
Per doz.	$3.65	4.25	4.75	5.75	6.40	

Sauce Pans, Light, Lipped, Retinned.

Nos.	09	010	012	014	016
Per doz.	$1.00	1.20	1.55	1.85	2.20
Nos.	018	020	022	024	026
Per doz.	$2.50	3.00	3.50	3.85	4.60

Sauce Pan Covers, Retinned.

Nos.	9	10	12	14	16	18
Per doz.	$0.40	.45	.50	.55	.65	.75
Nos.	20	22	24	26	28	
Per doz.	$0.85	.95	1.05	1.15	1.35	

Skimmers, Retinned.

Nos.	9	10	11	12	13	14	15
Per doz.	$0.80	.90	1.00	1.10	1.20	1.35	1.50
Nos.	22	23	24	25	26	27	
Per doz.	$1.20	1.30	1.40	1.50	1.65	1.80	

Skimmers, Patent Threaded Handles, Retinned.

Nos.	16	17	18	19	20	21
Per doz.	$0.90	1.00	1.10	1.20	1.35	1.50

Wash Bowls, Plain.

Nos.	12	13	14	15	16	17
Per doz.	$1.10	1.35	1.55	1.75	2.00	2.25
Nos.	101	102	103	104		
Per doz.	$1.90	2.20	2.50	3.00		

10 cts. per doz. added for Rings.

Wash Bowls, Plain, with Feet Loose.

Nos.	100	200	300	400
Per doz.	$1.30	1.55	1.75	2.25

Feet fast, 15 cts. per doz. extra; for Rings, 10 cts. per doz. extra.

Wash Bowls, Plain, with Feet Loose.

Nos.	010	020	031	035	040
Per doz.	$1.10	1.25	1.45	1.60	1.80

Feet fast, 15 cents per doz. extra; for Rings, 10 cents per doz. extra.

Wash Bowls, Plain, I C.

Nos.	6	6½	7
Per doz.	$0.90	1.05	1.20

For Rings, 10 cents per doz. extra.

Wash Bowls, Retinned, with Rings.

Nos.	6	6½	7
Per doz.	$1.20	1.35	1.55

Wash Bowls, Retinned, with Rings.

Nos.	12	13	14	15	16	17
Per doz.	$1.45	1.70	1.95	2.20	2.50	2.75

Wash Bowls, Retinned, with Rings.

Nos.	024	026	028	030	032
Per doz.	$1.85	2.20	2.55	2.85	3.05
Nos.	22	24	26	28	
Per doz.	$2.15	2.45	2.90	3.40	

Wash Bowls, Retinned, with Rings.

Nos.	30	32	34	36
Per doz.	$3.85	4.35	4.80	5.40
Nos.	101	102	103	104
Per doz.	$2.30	2.60	3.00	3.50

Wash Bowls, Retinned, with Rings, with Feet Loose.

Nos.	100	200	300	400
Per doz.	$1.70	1.90	2.15	2.75

Feet fast, 15 cents per doz. extra.

Wash Bowls, Retinned, with Rings, with Feet Loose.

Nos.	010	020	031	035	040
Per doz.	$1.45	1.60	1.85	2.05	2.35

Feet fast, 15 cents per doz. extra.

Water Pails, Retinned.

Nos.	4	5	6	7	8
Per doz.	$5.25	5.85	6.50	7.50	9.25
Nos.	8½	9	10	11	12
Per doz.	$10.50	12.85	14.90	17.35	23.60

COMMON STAMPED WARE, ETC.

Discount 25 per cent.

Bucket Covers.

Quarts	½	1	1½	2	3
Inch	4½	5 3-16		6 5-16	6¾
Per gross	$1.65	2.05	2.40	2.50	3.00
Quarts	3½	4	5	6	7
Inch	7	7 11-16		8¾	
Per gross	$3.40	3.90	4.50	4.90	5.65

IRON.

American Pig.—The state of the Iron market is much the same as at our last writing. Sales have been principally confined to small lots at about our quotations. We note the sale of 500 tons of a Lehigh brand, Nos. 1 and 2, on private terms, and about 400 tons Thomas Nos. 2 X and 1 at $16.50 and $18 respectively. We quote: Foundry No. 1, $16.50 @ $18; Foundry No. 2, $15.50 @ $16.50, and Gray Forge, $14.50 @ $15.50.

Scotch Pig.—There have been no arrivals of Scotch Iron at this port during the week and sales have been only in a retail way. We quote nominally: Eglinton, $21; Coltness, $22 @ $22.50.

Rails.—For Steel Rails there seems to be an active demand and some important transactions have been closed within a few days; thus we hear of 42,000 tons for Pensylvania R. R. Co., and two lots of 8000 and 6000 tons respectively, the destination of which we did not learn. All of the above are for future delivery. In Iron Rails there is nothing to report. We quote Steel in large lots at tidewater $43, and at mill $41 @ $44. For Iron Rails we continue our quotations, viz., $32 @ $36, according to quality, section, terms, &c.

Old Rails.—Within the past week there has been renewed inquiry for Old Rails and some business has been done. We note the sale of 1500 tons at our quotations. We quote as before, $18 @ $19 here.

Scrap.—We hear of sales of about 400 tons Scrap on private terms. We quote No. 1 Wrought from yard, $20 @ $21.

METALS.

Copper—Has been looking up a little, the demand from consumers being livelier. Sales of Lake Superior, 350,000 pounds at 15⅞¢ @ 16¢, part deliverable in January, mostly at the latter figure. The market remains firm, with nothing to be had under 16¢ at the close. Baltimore we quote nominally 16¢. Nothing has transpired in futures. There is nothing new by cable from London, and the inference is that prices remain unaltered. The following reaches us from there by mail, dated Nov. 23: "The market has again given way under the announcement that 3000 tons charters for the first half of this month; in addition to which the deliveries of the Chili produce have been very small, and the stock has slightly increased. It is a most unfortunate circumstance that since the Wallaroo auction sales the price of Copper, with little exception, has tended downward, and judging from the value of other descriptions of Copper and the present nominal quotations of Wallaroo, there is no doubt that the prices realized at the coming sale will be lower than those ever before known." There is no change in the combination prices, which, however, are to a great extent nominal. We quote; New Sheathing Copper, 26¢; Braziers, 28¢, and Bolts, 28¢; American Yellow Sheathing Metal, 13½¢; Yellow Metal Bolts, 25¢, and English Yellow Sheathing Metal, 12⅝¢ @ 12¾¢, currency, in bond.

Tin.—Our market has weakened since our last report, and we quote spot Straits, 16¢. The jobbing demand has fallen off, as is usually the case after Dec. 1. We quote at the close, in large lots, as follows: Straits, 16¢ @ 16¼¢; English Refined, 15½¢ @ 15¾¢; Common ditto, 15¢. Of Banca there is none in the market. London remains about the same, yesterday's cable dispatch quoting Straits, £64. 10/. Singapore Wires, $19.50 ₱ picul. The shipments from the Straits in November were 440 tons to the United States, and 540 tons to England. About 900 slabs Straits Tin have arrived here this week. *Tin Plates.*—The position of this article is an improving one both in Europe and here. We received the following from Liverpool by mail, dated Nov. 21: "An important item of news has just transpired, to the effect that most, if not all, of the remaining charcoal makers are likely to join in the short-time movement; if this is carried into effect it will give strength to charcoals, which they at present lack, as the market shows no improvement upon our quotations of last week. Ternes are a shade better, but not quoted higher. Coke Tins maintain their value, and it would be difficult to buy many at our quotations; market price is generally 3d. higher. Ternes can occasionally be met with at 13/6 @ 13/9, but only in odd lots." The following has been received by cable to-day: "Cokes very firm on an active business at 15/3 @ 15/6 per box. Charcoals 6d. higher on previous list." In this market a fair amount of activity prevails. We quote ordinary brands, large lots, per box, as follows at the close: Charcoal Bright, $5.87½ @ $6; Charcoal Ternes, $5.25 @ $5.37½; Coke Tin, $5 @ $5.25, and Coke Ternes, $4.75.

Lead.—Sales since our last report sum up 200 tons Common Domestic, 100 of which at 3.90¢ @ 3.95¢ (part to arrive) and 100 on the spot at 3.97½¢. The asking price is 4¢, and we believe none can be had now below this figure. Not much business is expected from now forward till the latter part of January. Although 4⅛¢ is asked for fine Lead, it may not bring over 4¢. Lead was procurable in England at £15 on the 21st ult., the market being very quiet. We quote manufacturers' prices, which are higher for Sheet, viz.: Bar, 5¢; Sheet, 6¢; Tin-Lined Pipe, 12¢; No. 1 Solder, 8½¢; all less 10 % to the trade.

Spelter and Zinc.—Common Domestic Spelter is very quiet, and cannot well be quoted over 4⅝¢, at which moderate sales are being made. We quote Bergenport, from Lehigh ore, 9¢, gold. A small sale of Silesian Spelter was effected at 5¾¢ to-day. *Domestic Sheet Zinc* has been rather more active of late at 5⅝¢ @ 5¾¢, the low price stimulating inquiry.

Nickel—Remains firm and moderately active at $1.25 for American.

Antimony.—There is little doing, and it can be obtained at 12¢ @ 12¼¢. No change is reported in the London market.

COAL.

The Coal trade at the present time is in a very quiet condition. The auction sale last week, the very general feeling among consumers that the combination will not last beyond the end of the year, and the doubt as to whether a new combination can be speedily formed, have all tended to bring about this feeling. The Bethlehem meeting showed pretty conclusively that the Lehigh men would not go on with a combination on the present basis, even though this action should bring on a free fight for tonnage. The reduction in prices at the auction sale increased the uncertain feeling in the minds of consumers. To-day there is to be a meeting, at which it is hoped that steps will be taken to form at once a new combination. The materials, however, are not of the most tractable character, and it is not altogether certain that some of the great Coal kings desire to continue the trade in its present unsatisfactory state.

Prices are quite generally unchanged, very few circulars having been issued since the sale. The Old Company have issued a circular with prices averaging about 25 cents lower than previously. Very little Coal is coming to market and stocks are very light. Lehigh is rather behind the very moderate orders, and it is quite probable that before the end of the month the entire allotment will be exhausted.

EXPORTS

Of Hardware, Iron, Machinery, Metals, &c., from the Port of New York, for the Week ending Dec. 3, 1878:

	Quan.	Value.
Havre.		
Ag. imp., pkgs	125	$7,036
Mf. iron, pkgs.	19	800
Pl'd ware, cs...	1	59
Hdw., cs.....	8	85
Mach'y, cs....	2	83
Hayti.		
Pumps, pkgs..	4	74
Nails, kegs....	82	213
Hdw., cs.....	24	210
Cadiz.		
Pumps, pkgs.	4	322
Bremen.		
S'dp'p'r, bdls.	21	198
Belting, cs....	1	300
Hdw., pkgs...	15	495
Ag. imp., pkgs	16	600
Mach'y, cs....	1	765
Antwerp.		
Arms, cs.....	40	4,000
Pl'd ware, cs..	6	364
Hdw., pkgs....	7	331
Belting, cs....	14	3,634
Glasgow.		
Hdw., pkgs. .	19	630
Liverpool.		
Mach'y., pkgs	61	5,281
Belting, cs....	7	1,343
Pl'd ware, cs..	9	380
Hdw., cs.....	139	5,113
Em'ry wh's, cs.	1	140
London.		
Cutlery, cs....	2	230
Tinware, cs....	1	65
Ag. imp., pkgs	143	1,401
Hdw., cs.....	373	7,496
Mach'y, cs....	107	10,235
British North American Colonies.		
Mf. iron, pkgs	5	70
Hdw., cs.....	2	140
Belting, pkge.	1	40
Powder mill..	1	2,600
Coal, tons.....	75	300
Nails, kegs...	25	100
Mach'y, pkgs.	6	160
British West Indies.		
Hdw. pkgs...	25	447
Nails, kegs...	15	36
British Honduras.		
Hdw., pkgs..	6	71
British Australia.		
Ag. imp., pkgs	63	1,946
Mf. iron, pkgs.	34	729
Gas fixt., cs..	25	451
Wire, bdls....	6	180
Tacks, cs.....	20	125
Mach'y, pkgs.	11	2,369
Springs, cs....	10	120
Brass g'ds, cs.	6	790
Nails, kegs...	20	72
C'ge mtls, pgs	164	4,077
Hdw., pkgs....	461	10,997
Wringers, cs..	42	1,127
Pl't'd ware, pgs	7	657
Pumps, pkgs..	3	150
S'dpaper, cs..	10	750
Pumps, pkgs.	4	427
Cuba.		
Mach'y., pkgs.	1823	16,903
Nails, kegs....	210	552
Mf. iron, pkgs	394	1,530
Scales, pkgs...	169	3,177
Wire, pkgs....	4	105
Hdw., pkgs...	564	8,287
Coal, tons.....1043		5,384
R.R. mtls. pgs	6540	20,870
Pumps, pkgs.	16	1,936
Pl't'd w're, cs.	1	75
Argentine Republic.		
Ag. imp, pkgs.	332	6,273
Mach'y, cs....	1	49
Hdw., pkgs....	245	5,718
S'dpaper, cs..	20	255
Irons, cs.....	50	615
Pumps, pkgs..	1	6
Africa.		
Br'ss k't's, cks	26	4,476
Rifles, bxs....	3	110
Nails, kegs...	213	570
Hdw., pkgs...	47	386
Mf. iron, pkgs	24	140
Brazil.		
Pl't'dware, cs..	4	260
Mach'y, pkgs.	268	$5,484
Iron wheels...	200	1,492
Ag. imp., pkgs	63	685
Pumps, pkgs.	9	497
Cutlery, cs....	42	821
Iron, cs.....	6	45
Windmill	1	95
Mf. iron, pkgs.	1764	2,339
Barrows.....	60	75
Peru.		
Mf. iron, pkgs	46	775
Hdw., cs.....	152	2,157
Cutlery, cs....	1	36
Iron safes....	2	532
Tacks, bxs....	152	1,794
Steel, cs.....	37	3,000
Ag. imp., pkgs	89	1,602
S'ndp'p'r., cs.	14	746
Tinware, cs...	6	163
Nails, bxs....	28	110
Belting, bbls..	1	62
Porto Rico.		
Grindstones ..	195	305
C'ge mtls., pgs	67	181
Nails, kegs...	275	695
Mf. iron, pkgs	17	159
Hdw., cs.....	57	611
Ag. imp., pkgs	7	198
Dutch West Indies.		
Arms, cs.....	13	1,904
Iron safe.....	1	98
Powder, lbs...2500		470
Nails, kegs...	13	56
Hamburg.		
Mach'y, pkgs.	52	3,065
Spelter, slabs.2884		8,820
Pl't'd ware, cs.	3	534
Belting, bales.	8	1,072
Hdw., cs.....	95	3,339
Ag. imp., pkgs	8	467
Pumps, pkgs.	1	70
Bristol.		
Cop'r ore, cks.	145	6,480
United States of Colombia.		
C'ge mtl., pgs	17	359
Mach'y, pkgs.	100	4,822
Cutlery, cs....	102	3,368
Ag. imp., pkgs	28	637
Tinware, cs...	9	276
Per. caps, cs..	1	90
Chain, pcs....	2	191
Tin, pkgs.....	8	89
Steel, cs.....	73	572
Wire, pkgs....	206	2,305
Tinware, cs...	2	189
Guns, cs.....	20	4,500
Gas fixt., cs...	8	102
Hdw., cs.....	268	6,268
Arms, cs.....	16	495
Pl't'd ware, cs.	9	937
Nails, kegs...	37	114
Plum. mtl., cs.	8	82
Cartridges, cs	268	4,543
Mf. iron, pkgs.	476	1,690
Iron, pcs.....	111	1,195
Tin plate, cs..	9	380
Brass go'ds, cs	2	351
Pumps	4	100
Mexico.		
Wire cloth, cs.	1	70
Pl't'd ware, cs	1	80
Revolvers, cs.	3	1,056
Tin, bxs.....	13	72
Nails, kegs....	78	220
Ag. imp., pkgs	17	227
Wire, pkgs....	10	103
Arms, case...	1	73
Pistols, cs....	1	300
Hdw., cs.....	109	2,477
Guns, cs.....	5	786
Mf. iron, pkgs	82	672
Mach'y., cs...	40	2,889
Pumps, pkgs.	8	202
Cutlery, pkgs.	39	1,939
Per. caps, cs..	5	285
Tacks, cs.....	4	128
Windmill.....	1	788
Cartridges, cs.	5	172
Met'l g'ds, cs.	1	60
Iron, pkgs....	10	124
Lisbon.		
Hdw., cs.....	27	350
China.		
Pumps, pkgs.	11	556
Hdw., cs.....	1	60
Bell.....	1	100
Mf. iron, pkgs.	83	852
Coal, tons....	142	548

IMPORTS

Hardware.

Boker Hermann & Co.
Hdw., cutlery and guns, pkgs., 29
Blume & Co
Wire rope, coils, 2
Crabb William,
Grindstones, 19
Curley J. & Bro.
Cutlery, cs., 2
Guental Geo. & Sons,
Ironwares, cs., 29
Mulford, Carey & Conklin,
Hdw., cs., 1
Merchants' Dis. Co.
Guns, cs., 1
Arms, cs., 16
Moore's John P. Sons,
Cartridge cs,, cs., 5
Arms, cs., 5
Pratt S. T. & Co.
Cutlery, cks., 1
Squires H. C.
Guns, cs., 1
Straus & Co.
Casks, 1
Schuyler, Hartley & Graham,
Guns, cs., 2
Spies, Kissam & Co.
Arms, cs., 6
Schoverling & Daly,
Mdse., pkgs., 5
Guns, cs., 2
Gun barrels, cs., 2
Struller Son & Co.
Metal cart'es, cs., 1
Tillottson L. G. & Co.
Gal. wire, lots, 71
Thompson C. L.
Wire, cks., 4
Wallach A. & E.
Cases., 2
Walsham J.
Cases, 4
Wiebusch & Hilger Hdw. Co.
Cu lery and hdw., pkgs., 35
Order,
Packages, 16
Casks, 7
Cutlery, cs., 3
Guns, cs., 8
Wads, cs., 3
Files, cs., 1
Chains, cks., 10
Wire, bdls., 3
Shovels, bdls., 3
Rivets, kegs, 40
Without bills of Lading.
Cotton ties, bdls., 11,288
Wire net'ng, rolls, 24

Iron.

Lundberg Gustave,
Swedish bars, 1721
Marvel W. D.
Ore, tons, 300
Naylor & Co.
Spiegel, lots, 1
Bars, 2683
Pig, tons, 100
Phelps, Dodge & Co.
Sheet, bdls., 383
Sheet, bxs., 210
Order,
Spiegel, tons, 192⅓
Pig, tons, 200
Spiegel, lots, 1
Spiegel, kilos., 283,421
Sheet, pkgs., 300

Steel.

Brown William,
Bundles, 129
Crabbe William,
Bundles, 11
Naylor & Co.
Bundles, 30
Scrap spring, tons, 125
Prosser Thomas & Sons,
Mdse., pkgs., 43
Woodford W. O.
Bundles, 180
Bars, 4
Cases, 7
Wilson & James,
Casks, 1
Order,
Casks, 32
Cases, 13
Tyres, 8
Rods, bdls., 183
Bundles, 157
Without Bill of Lading,
Cases, 11

Metals.

Brown Bros. & Co.
Tin ingots, 649
Bruce & Cook,
Tin plates, bxs., 116
Byrne Jos. & Co.
Tin plates, bxs., 2265
Cort N. L. & Co.
Tin plates, bxs., 950
Tin and terne plates, bxs., 561
Kimhardt & Co.
Scrap cop., bbls., 1
Lamarche H.
Zinc, cks., 35
Montell F. T. & Son,
Scrap brass, cks., 11
Scrap cop., cks., 4
Scrap zinc, cks., 1
Naylor & Co.
Tin plates, bxs., 3995
Phelps, Dodge & Co.
Tin pl't's, bxs., 18,324
Tin ingots, 295
Antimony, cks., 75
Scheider Jos. & Co.
Tin plates, bxs., 213
Order,
Tin plates, bxs , 1057
Tin, slabs, 272
Tin, ingots, 1602
Tin and terne plates, bxs., 5881
Without Bill of Lading.
Tin plates, bxs., 403

OLD METALS, PAPER STOCK, &c.

Lead and Zinc are in good demand, and prices are firm at quoted rates. Iron, Brass and Copper are very dull, and the prospect of lower rates deter many from buying. Stove Plate is a trifle better, though the improvement is slight. There is very little doing in the market for Rags, Paper Stock and Rope, and prices are growing weaker.

The purchasing prices offered by dealers for Old Metals are as follows:

Copper, heavy.....	per lb.	$0.1	@ ....
Copper Bottoms...	"	.10½	@ ....
Yellow Metal.....	"	.10	@ ....
Brass, heavy.....	"	.09½	@ ....
Brass, light	"	.08	@ ....
Composition, heavy.	"	.11½	@ ....
Lead, solid.....	"	.02½	@ ....
Tea Lead.....	"	.02	@ ....
Zinc.....	"	.02¾	@ ....
Pewter, No. 1.....	"	.10	@ ....
Pewter, No. 2.....	"	.08	@ ....
Wrought Iron.....	per ton.	$16.00	@ ....
Light do.....	"	9.00	@ ....
Stove Plate.....	"	9.00	@ ....
Machinery do.....	"	11.00	@ ....
Grate Bars	"	3.50	@ ....

The prices current for Rags, &c., are as follows:

Canvas, Linen.....	per lb.	3 c.	@ 3½c.
" Cotton, No. 1.....	"	3½c.	@ ....
" " No. 2.....	"	1½c.	@ ....
White, No. 1.....	"	3½c.	@ 3¾c.
" No. 2.....	"	2 c.	@ ....
Seconds.....	₱ lb.	1½c.	@ ....
Mixed, Woolen.....	"	2 c.	@ 3 c.
Soft, do.....	"	6½c.	@ 7 c.
Gunny bagging.....	"	3 c.	@ ....
Jute butts.....	"	2¼c.	@ ....
Kentucky bagging	"	3 c.	@ ....
Book Stock.....	"	2½c.	@ ....
Newspaper Stock	"	1 c.	@ 1¼c.
Waste Paper and Scraps.....	"	½c.	@ ....
Kentucky Bale Rope	"	4 c.	@ ....
Tarred Shaking.....	"	1 c.	@ 1¼c.
Grass Rope	"	....	@ 2¼c.

PHILADELPHIA.

Office of *The Iron Age*, 220 South Fourth St.
PHILADELPHIA, Dec. 3, 1878.

Pig Iron.—There is no special change to note in the general condition of the Iron market, but prices are steady, and the average of sales have undoubtedly been at somewhat higher figures than were current during the early part of last month. There is no surplus whatever of really good Mill and Foundry Irons, and for such full market prices are realized for pretty much all that is offered. The demand keeps up better than was anticipated, and instead of accumulating stock, most of the furnaces are sold close up, with inquiries indicating an active business for some time longer. This in fact is one of the strongest features of the trade, and has had the effect of imparting much strength to the market and sanguine anticipations in regard to the immediate future. Consumers are evidently using more Pig metal than at this time last year or the year previous, and although they have not purchased large lots, the aggregate shows a steady and increasing business. In point of fact, the Pig Iron trade proves conclusively that business is improving. The demand is of so general a character and so steadily maintained as to be very assuring. The season is at hand, however, when a decrease in the volume of business must be expected, but affairs are in good shape, and unless something unforeseen occurs, the new year will no doubt open auspiciously for the long-depressed Iron interests. In this connection the following from the President's message will no doubt command general approval:

"Let it be understood that during the coming year the business of the country will be undisturbed by governmental interference with the laws affecting it, and we may confidently expect that the resumption of specie payments, which will take place at the appointed time, will be successfully and easily maintained, and that it will be followed by a healthful and enduring revival of business prosperity.

"Let the healing influence of time, the inherent energies of our people, and the boundless resources of our country, have a fair opportunity, and relief from present difficulties will surely follow."

We have reports of furnaces being put in blast from time to time, but there appears to be nothing said about furnaces being blown out. Without going into details, we feel safe in asserting that during the last three months for every furnace blown in there has been at least one blown out, so that essentially production remains as before. It is true, however, that three Lehigh companies are making preparations to blow in a furnace or two additional toward the close of the year, if business seems to warrant it. A meeting of the stockholders of the Allentown Iron Company was held on the 29th, but no definite decision was reached as to future operations. A committee of five was appointed with full power to examine into the condition of the company's affairs, and to report to an adjourned meeting to be held on the 19th prox. Two furnaces will be kept in blast until that date, and no doubt continued if the committee so recommend. Prices may be called firm, particularly for established brands; inferior lots, although nominally very cheap, do not attract attention. We quote: Select No. 1 Foundry, $17.75 @ $18.50; ordinary Lehigh brands, $17 @ $17.50; No, 2, $16; Gray Forge, $15 @ $16; White and Mottled, $14.50.

Blooms—Continue dull, and it is difficult to sell large lots. Prices are nominally unchanched, viz.: Blooms (2464 lb), $38 @ $39; Northern Ore Blooms (2240lb), $33 @ $37; best quality Charcoal Billets (2240 lb), for wire and steel purposes, $58 @ $60; Bars do., $62.50 @ $65; Sheet Iron Blooms, cornered (2464 lb), $53 @ $55; Cold-blast Charcoal Plate Blooms, $50 @ $53; run-out Anthracite, $45 @ $47.50.

Muck Bar.—There are buyers at $28 @ $29, but holders ask $30 and upward, so that there is very little business doing. Small lots of extra quality command about $32.

Structural Iron.—The chief of interest this week is in the contract made by the Phœnix Iron Co. with the Metropolitan Elevated Railway for some 12,000 tons of iron for the extension of their road in the upper part of New York city. This contract secures to them a full winter's work for their extensive establishment—a matter of much importance to the trade at large as well as to the company itself. Outside of this the market is flat and business quieter than it has been for some time past. Prices are a little unsteady, and desirable orders would be accepted at some concession from quoted rates, which are nominally as before, viz.: Angles, 2.2¢ @ 2.4¢; Tees, 2.4¢ @ 2.5¢; Beams and Channels, 2.7¢ @ 2.8¢

Plate and Tank Iron.—The market has been a little more active during the past week, and a considerable number of small lots have changed hands, but prices are weak, and it is said that concessions have been made in nearly every transaction of importance. The orders have been for lots of 20 to 30 up to 100 tons each, and usually for immediate delivery, but as several mills are bare of work competition has been close, and the market has a slight downward tendency. The oil pipe line mentioned some two months ago it is said will soon be commenced. A company has been organized, and it is claimed that a sufficient amount of money has been paid in to guarantee the completion of the line. There is other work mentioned as likely to soon come on the market, but there is some anxiety to secure immediate business; hence the weakness in prices, which are nominally as follows: Common Plates, 2.2¢ @ 2.3¢; Tank Iron, 2.3¢ @ 2.5¢; C. No. 1, 2.4¢ @ 2.6¢; Shell Iron, 2.75¢ @ 2.9¢; Flange Iron, 3.7¢ @ 4¢; Solid Firebox, 4.85¢ @ 5¢, and Best Bloom, 5.5¢ @ 6¢.

Sheet Iron.—We have again to note a very active market. The demand is steadily maintained, and the season will apparently be more prolonged than usual. A much larger business has been done than for some years past, but there is the old complaint of unremunerative prices. At this late season no change in prices can be expected. Stocks are too much reduced for a decline, and with the falling off in the demand usual at this season an advance is equally improbable. We quote: Common Sheet, No. 20 to 23, 2.8¢ @ 2.9¢; No. 24 to 26, 2.9¢ @ 3¢; No. 27 to 28, 3.1¢ @ 3.15¢; Best Refined Sheet, No. 25 to 28, 3.2¢ @ 3.3¢; No. 22 to 24, 3.1¢ @ 3.2¢; No. 16 to 21, 3¢ @ 3.1¢; Best Bloom Sheets, No. 25 to 28, 5.1¢ @ 5.2¢; No. 22 to 24, 5¢; No. 16 to 21, 4.7¢ @ 4.8¢; Refined Plates or Blue Annealed, 5-16 to 16, 2.3¢ @ 2.4¢; American, R. G., 5-16 to 16, 2.9¢ @ 3¢; Best Bloom, 5-16 to 16, 4.8¢ @ 4.9¢; A Patent Planished, 10½¢; B Patent Planished, 9½¢; Best Bloom Galvanized, 45 % discount; second quality, 55 %; extra discounts for large lots.

Bar Iron.—The market is a little unsettled, owing to rumors that some of the mills have been cutting prices. As all the manufacturers repudiate the charge on their own behalf, it is just possible that the report may have originated from some buyer who *merely thought* prices would be shaded. In any case buyers hold off, demanding concessions, and at least some of the outside manufacturers are disposed to yield, fearing that others may meet buyers' terms, if they have not already done so. This has caused an uneasy, dissatisfied feeling among both buyers and sellers, and it seems as though the Bar trade is drifting into the same demoralized condition as noticed during the summer months. This is much to be regretted, as there is a fair amount of business offering, and nothing is so likely to drive a buyer out of the market as the prospect of lower prices. It is well known, too, that there is no money to be made even at current quotations, while lower figures must leave an absolute loss, unless quality is made in proportion to price. Some of the manufacturers take rather a despondent view of the market, but as a matter of fact there is business enough to be had, but as remarked to-day, "each mill wants to get it all." This is perhaps the chief reason of prices being cut. Some are rather bare of orders, while others have all they can fill during the next six or eight weeks. There are some inquiries for large lots, but it is quite likely that the anxiety to sell has caused buyers to defer purchasing in anticipation of better terms later on. We quote: Common Iron, 1.5¢ @ 1.65¢; Medium, 1.7¢ @ 1.85: Best Refined, 1.9¢ @ 2¢.

Steel Rails.—The market continues active and feverish. Some large contracts have been completed during the past ten days, and others are likely to be closed at an early date. Something over 60,000 tons have been divided among the Pennsylvania mills, at prices said to average a trifle over $42, at mills. Several large orders are being held back in anticipation of better terms, but with such a certainty of a large demand it is not likely that manufacturers will make concessions. Buyers are said to be willing to pay $41, but higher prices are asked, and it is understood have been obtained in the large transactions above noted. The market is unsettled, however, and $41 @ $43 may be considered the extreme figures at which business has been done during the past ten days.

Steel Blooms.—Slabs are quoted at $42 @ $46, and Billets at $48 @ $50.

Iron Rails.—The market is unchanged, and prices are said to be steady, but there is less urgency in the demand, and it is likely that a good cash order would be accepted at old prices. There are inquiries for lots of from 500 to 1500 tons each, but the terms offered are not considered desirable, so that there is but little chance of business as matters now stand. The mills are fairly employed and are unwilling to entertain proposals unless for cash or its equivalent. Light Rails are still wanted at about $35, at mills, heavy sections, $32.50 @ $33.50.

Old Rails.—The market continues bare of stock and prices are therefore firmly maintained. Those who require immediate deliveries have had to pay $20 for small lots up to $21 for very choice quality, but $19.50 @ $20 is nearer the market value of average qualities. There is some demand for spot delivery but it is not likely that large lots could be placed unless at about $19.50. We quote the market steady at $19.50 @ $20.

Spikes.—The demand continues good and prices steady as follows: 5½ x 9-16, 2¢; ¼ x 4 and longer, 2.3¢; 7-16 x 4 and longer, 2.4¢; ⅜ x 3½ and longer, 2.7¢; ⅜ x 3 and longer, 2.8¢.

Scrap Iron.—The market is fairly active, and selected qualities command outside figures, viz.: Cast, $14 @ $15; Wrought, $20 @ $22.50.

Old Car Wheels.—Sales of a lot at $16 at a point in the interior.

Shot.—Very active at former prices, viz.: 8¢ @ 9¢ for American Chilled, 6½¢ @ 7½¢ for Drop, 7½¢ @ 8½¢ for Buck. All less the regular trade discount of 10 ₱ cent.

PITTSBURGH.

[*By Telegraph.*]

PITTSBURGH, Dec. 4, 1878.

A meeting of the Western Nail Association was held this day, at which the card rate was advanced to $2.15. Terms, 10 cents reduction on lots of 200 kegs and 2 per cent. discount for cash. The meeting was largely attended.

Office of *The Iron Age*, 77 Fourth Avenue,
PITTSBURGH, PA., Dec. 3, 1878.

The wet, stormy weather of the past week has had an unfavorable influence upon general business, which at best is always a little tame this month, just at the close of the year, when people want as little stock as they can possibly help. Our manufacturers generally report orders as having fallen off considerably recently. Some of them who were pressed a few weeks ago are now easy in this respect, and the probability is that the lull which has set in will continue until after stock taking has been completed, which is usually about the middle of January. While the volume of business this fall has exceeded that of any former fall for several years, and prices generally have ruled steady, there has been in most of the leading articles of manufacture a very small margin for profit. In some, included in which may be named Nails and Window Glass, manufacturers have done well during the past year if they held their own; some of them, it is feared, will discover, when their trial sheet has been made out, that the balance is on the wrong side. However, it is generally admitted that matters are getting into better shape; business is assuming a healthier and more legitimate attitude, and people are becoming reconciled to work on smaller margins. It is also worthy of notice that men devoid of either means or principle can no longer do business; the credit line is being drawn so closely that they cannot stand the test; hence the outlook is better for those who do a legitimate business and make it a point to pay dollar for dollar. It has been pretty thoroughly developed during the past few years that a great many people were doing business on other people's money, and as money is not so easily borrowed now as it was before the panic, these men of straw have been forced to succumb, and the atmosphere is not favorable for their early recovery. Such men and firms are largely responsible for the very unsatisfactory condition of business for years past. With no capital and a weakened credit, they were forced to sacrifice their products as best they could, regardless of cost, in order to realize funds, and in so doing not only hurt themselves, but all others engaged in the same business. As a rule, our manufacturing interests are in stronger and better hands, and the number of those willing to sell their products below cost is growing less and less.

Pig Iron.—The lull noted in our report of last week still continues, and there is not likely to be any improvement in the demand until next month, and not then until stock taking has been completed, as consumers, almost without an exception, will adhere closely to the hand-to-mouth policy during the time in question. With this exception—a decreased demand, which is always looked for this month—there has been very little change in the market here for some time past. Some operators are inclined to think that the common qualities—of which there is nearly always an oversupply—are weaker, but so far as we can learn, there have been no sales at any reduction, nor is there any disposition to make concessions in order to effect sales. Nearly all the furnaces in blast are working on contracts; hence there is but little, if any, accummulation in first hands, producers as a rule, for a year or more past, having made it a point not to accumulate stock. Bituminous Coal Smelted still quotable at $19 @ $20, 4 mos., for Foundry, and $17.50 @ $19.50 for Mill, the outside figure for all-ore Red Short. Coke Irons, $16, cash, to $16.50, 4 mos., for mill; Charcoal—sales of No. 1 Foundry at $24 @ $25, 4 mos. Bessemer Pig continues very quiet; no sales reported for several weeks, in the absence of which we continue to quote at $20, 4 mos.

Manufactured Iron.—Our manufacturers generally report a falling off in orders; however, this is always expected in December, hence it creates no surprise. Business this fall has been better than during same time for some years past, and with an increased demand and diminished production, a number of mills having passed into the hands of their credi-

tors, prices, although by no means satisfactory to makers, have ruled steadier, and the outlook at the present time is encouraging, as there is every prospect of a good spring trade and better prices. Merchant Bars still quoted at 1.75¢, 60 days; Sheet on a basis of 2.75¢, 60 days, for No. 24; Hoop at a 2.50¢ card.

Nails.—The market, not only here, but at Wheeling and all competing points in the West, is decidedly firmer, and there are but very few, if any, sellers at rates common a few weeks ago. Sales were made as low as $1.87½ and even $1.85 net cash, but it is doubtful whether an order of any magnitude could now be placed under $2, if at that. As intimated in our report of last week, the feeling has prevailed for some time past that an advance was only a question of time, hence the unwillingness of Pittsburgh manufacturers and some of those at Wheeling to sell at the ruinous prices ruling, realizing as they did that the more there were sold at the rates in question the less money the seller would have. Pittsburgh makers awaited the issue with considerable interest; they knew perfectly well that they could not sell at the ruling prices, and they had about made up their mind that if Wheeling and other competing points in the West could realize a profit at the prices at which they were selling, that they (the Pittsburghers) might as well quit the business. It appears, as expected, however, that Nails can be made here as cheaply as at the points in question, and our Pittsburgh manufacturers, having no contracts, are in good condition for an advance. A meeting of the Western Nail Association, the first since last July, will take place here and its action will be sent to *The Iron Age* per wire.

Rails.—The Market for Steel Rails continues steady at $44, cash, at mill or delivered free on cars or barge in Pittsburgh. The Edgar Thomson Company made a sale last week for next year's delivery at equal to our quotation. The indications are that the Steel Rail mills will have all they can do in 1879, hence the market is firm, and prices are more likely to advance than decline. New Iron Rails are also firm, with considerable inquiry, and it is understood that the Cambria Iron Company are now asking $36, deliverable at mill. The market for old Iron Rails continues in an unsettled condition; with considerable inquiry and light offerings prices are firm, with buyers unwilling to pay the price at which they can be sold, hence there has been but little done recently. We continue to quote at $23, although a rumor prevails of a sale at $24. Taking the cost at most sources of supply they cannot be sold here under $24, and this buyers appear unwilling to pay. Some of the Nail mills have been using old Rails recently, but the experiment here in Pittsburgh has not been very satisfactory; one of our most prominent firms report having given the matter a full and thorough test, and it having turned out unsatisfactory they have abandoned their use.

Steel.—The demand for all kinds of Steel has fallen off somewhat within the past few weeks, but the mills generally still have about all they can do, and some of them are quite busy. Tool Steel, 10½¢ @ 12½¢, as to quality; Machinery, 4½¢ @ 7¢; Boiler Plate, 6½¢ @ 7½¢; Plow do., 3¾¢ @ 7¢; Spring Steel, 3½¢ @ 6½¢; Tire Steel, 3½¢ @ 6¢. Steel Billets, $43.50 @ $45, cash at mill; Steel Blooms, $41.50 @ $42; Steel Rail Ends, $30; Steel Bloom Ends, $30 @ $32, all cash at mill.

Wrought Iron Pipe.—The market for all kinds of Pipe continues dull, as it usually is at this season of the year, with but little prospect of any improvement before the spring trade opens up. Discount on butt weld, 60 to 65 %, with rumors of even 70 % being allowed. Boiler Tubes, 40; Oil-well Casing and Tubing, for which the demand is exceedingly light, net cash.

Scrap.—There is a fair business, but no recent changes in prices, which dealers report are too low here as compared with the cost at sources of supply. Old Car Wheels, gross, $18 @ $19; Cast Borings, $10 @ $10.50; Boiler Scrap, in sheets, $21.50 @ $22.50, net; Blacksmith, $20; Wrought Turnings, $15; No. 1 Railroad Wrought Scrap, $21; Car Axles, $28; Car Springs, $31.

Coke.—There is no abatement in the demand, which is unusually active, and prices are still tending upward. We now quote at $1.05 @ $1.10 ℔ ton, delivered free on cars at mine. Large shipments are being made in all directions, both by river and rail, and makers have all they can do.

Coal.—The market continues in a fairly active condition. Liberal shipments are being made, both by river and rail, and since the advance in the down-river markets operators have been able to realize a fair margin for profit. Nearly all works in the Monongahela and Youghiogheny valleys are now in operation, the operators having acceded to the demands of the miners, and it looks as if there would be a demand for all the Coal that can be got out for some time to come.

Window Glass.—Business is falling off, as it always does this month, and there is not likely to be any improvement until the spring trade opens up. No change in prices.

CHATTANOOGA.

Office of *The Iron Age*, Market and 8th Sts., CHATTANOOGA, Nov. 30, 1878.

General business throughout this district is excellent. It reminds an observer of the reaction of a spring. I hear men engaged in different lines of manufacturing say that their business is only limited by their capital. Some say they could profitably use twice the capital they could have profitably employed a year ago. But while manufacturing business is extremely brisk it will require several weeks yet before much money will get into general circulation from the hands of masters through those of the men. As a consequence of this last-mentioned fact, general mercantile business is rather restricted. Iron mills are all running full, with good show of orders. Old Rails are in good demand. Two hundred tons Wrought Scrap changed hands during the week on private terms. The weather during the first of the week was very rainy. The week closes with cool days and frosty nights; the late heavy rains have filled all the streams and set many idle boatmen to work. The general health of the Tennessee Valley is exceptionally good; there has been no case of fever here for 16 days.

Pig Iron.—The movement is steady. We note an increased demand for January and February delivery. We quote: Coke Irons, No. 1 Foundry, $17.50 @ $18; No. 2, $15.50 @ $16; Gray Forge, $13.50 @ $14; White and Mottled, $11.50 @ $12. Hot-Blast Charcoal—No. 1 Foundry, extra, $20 @ $21; ditto, $18 @ $20; No. 2 Foundry, $16 @ $18; Gray Forge, $15 @ $17; White and Mottled, $15. Cold Blast Charcoal—Car Wheel Metal $22.50 @ $27.50; do., Extra Standard, $24 @ $20.50; Forge, $17 @ $22.

Muck Bar—$27 @ $34. Old Rails, $18 @ $18.50. Old Car-wheels, $18.

Ores.—Brown Hematite, 50 to 56 %; per ton, $1.75 @ $2.25. Red Fossiliferous, 50 to 56 %; per ton, $1.70 @ $1.90. The above prices for ores delivered in Chattanooga on cars or on the wharf from flat boats.

Nails.—There is nothing new to note. The mill here is running four days in the week and manages to market the product. The four days' time was accepted by the nailers rather than a reduction in pay, though the machines produce as much as they did when running six days, the mill saving two days' motive power expenses, and the same on feeders, helpers, &c. We quote at $2.25 rates, with usual reductions on large lots.

Manufactured Iron.—Trade is better than it has been for many months. An advance is anticipated by the first of the coming year of 1.10¢ @ 2.10¢ per ℔. Bar we quote at $2; Railroad Spikes, $2.50; Light Rail, $2.25; Track Bolts, $3; Trestle Bolts, $4.

Coke.—The supply is full and quality improved. We quote at $2.50 per ton on cars in Chattanooga.

Coal.—The market is only fairly brisk. We quote at $1.50 @ $1.75 per ton for run of mine on cars in Chattanooga.

Pig Lead.—Local mines are now furnishing full supplies of Lead in car-load lots and of excellent quality. We quote it at 4¢.

Ingot Copper—Is slightly better in price and demand than it has been. We quote at 18¢.

Iron Rails.—We quote them at $34 per ton, with a fair demand.

BOSTON.

DEC. 2.—*Pig*—A few holders report a better feeling, but the figures of sales which they give hardly bear out their assertions. The Thomas Iron Company have advanced their price to $18 for No. 1, but have not been able to effect any sales at that figure. Freights this way from New York and Philadelphia continue high. At the shipping ports, Foundry No. 1 is quoted at $16.30 @ $17; Foundry No. 2, $15.50 @ $16.50; Gray Forge, $14.50 @ $15.50. There is nothing new in the market for Scotch Pig. Eglinton is still held at $22.50, Glengarnock at $24, Gartsherrie at $25 and Coltness at $26. The inquiry in Steel Rails which we noted last week continues, and the mills report that they are full of orders. We quote $43 at tidewater and $41 @ $44 at mill. Iron Rails are held all the way from $32 to $36. A sale of 3000 tons Steel Rails is reported on p. t. Nails have been in fair demand, jobbing now at $2.25 @ $2.30. For 100-keg lots $2.20 is the price. Sheet is selling at 3¢ @ 3¼¢ ℔ lb. Russia is quiet at 10½¢ @ 11¢. We quote English Spring Steel at 7¢ @ 8¢, gold; 9¢ @ 11¢ for German; 9¢ @ 11¢ for Machinery; 14¢ @ 15¢ for Cast; 10¢ @ 12¢ for Blister; 8¢ for American Spring; 13¢ @ 13¾¢ for Cast; 9¢ for Blister, and 7¾¢ @ 8¢ for Machinery. In Plate Iron there continues to be a fair degree of activity in Tank, which is selling steadily at 2¼¢. Boiler Plate is very dull, quoting 2½¢ for No. 1 Charcoal, 2⅜¢ @ 2¾¢ for No. 1 Shell, and 3¾¢ for Flange. Merchant Bar jobs at $1.65 @ $1.75. *Copper* has ruled very quiet, with sales of some 200,000 lbs. Lake at 15⅞¢. The market closes firm, many holders insisting on 16¢. There is still a good deal of talk about a war between Chili and the Argentine Confederation, the occurrence of which would tend to advance the price of Copper. For manufactures we quote: New Sheathing at 24¢ @ 26¢. The outside price rules in small transactions, but large buyers are purchasing at the inside figure. Bolts are quoted at 26¢ @ 28¢. Yellow Metal Sheathing continues easy, quoting 12½¢ @ 13¢ for English, and 13¢ @ 13½¢ for American; Yellow Metal Bolts, 18¢ @ 20¢. *Lead* continues firm under speculative control. We quote: Pig, 4½¢, currency; Sheet, 5½¢; Pipe, 4¾¢; Tin-Lined Pipe, 12¢; Bar Lead, 4¾¢; all of these excepting Pig are subject to the usual trade or 10 % discount. *Antimony* is firm and fairly active, and we quote 12¢ @ 12½¢. *Spelter* continues firm, with little disposition on the part of buyers to sell on the spot at less than 4¾¢ @ 5¢ for 10-ton lots. *Tin* has ruled very quiet at former quotations. The Pembroke, from Liverpool, brought 770 boxes Tin Plates, order. The Bavarian, from Liverpool, brought 50 boxes Tin Plates, Thayer & Lincoln; 270 boxes Tin Plates, J. Pierce; 270 boxes Terne Plates, Farrar, Follett & Co.; 243 boxes Tin Plates, order. The Massachusetts, from Liverpool, brought 500 boxes Tin Plates, J. B. Moors & Co.; 1100 boxes Tin Plates, order. The bark Marie Riebeck, from Singapore, brought 1177 slabs Tin, Cyrus Wakefield & Co.; 134 slabs Tin, Temple R. Fay. London remains steady at £65 for Straits. Singapore has advanced to $20 per picul. We quote: Straits, 16½¢ @ 16¾¢; Banca, 19¢; Refined English, 16¢ @ 16¼¢, gold. We quote Plate: Charcoal, I. C., $5.75 @ $6; Coke, $5 @ $5.25; and Charcoal Terne, $5.40 @ $5.50, gold.—*Commercial Bulletin.*

LOUISVILLE.

Messrs. GEO. H. HULL & Co., under date of Dec. 2, write us as follows: The demand is falling off somewhat in consequence of the near approach to the new year, when manufacturers take their account of stock. Prices are as firm as ever, and we anticipate no weakness in this respect, but, on the contrary, all the indications are that they will be higher in January and February. The usual time, 4 mos., is allowed on the quotations below:

FOUNDRY IRONS.

No. 1 Hanging Rock, Charcoal	$21.00 @ 22.00
No. 2 " "	19.00 @ 20.00
No. 1 Southern, Charcoal	18.00 @ 18.50
No. 2 " "	16.50 @ 17.00
No. 1 Hanging Rock, Stonecoal and Coke	19.00 @ 20.00
No. 2 Hanging Rock, Stonecoal and Coke	18.00 @ 18.50
No. 1 Southern, Stonecoal and Coke	18.50 @ 19.00
No. 2 " "	17.00 @ 17.50
"American Scotch"	18.00 @ 19.00
Silver Gray	16.00 @ 17.00

MILL IRONS.

No. 1 Charcoal, Cold-short and Neut'l.	16.50 @ 17.00
No. 1 Stonecoal and Coke, Cold-short and Neutral	16.50 @ 17.00
No. 2 Stonecoal and Coke, Cold-short and Neutral	15.50 @ 16.00
No. 1 Missouri and Indiana Red-short	20.00 @ 21.00
White and Mottled, Cold-short and Neutral	14.50 @ 15.00

CAR WHEEL AND MALLEABLE IRONS.

Hanging Rock, Cold-blast	29.00 @ 33.00
Alabama and Georgia, Cold-blast	28.00 @ 29.00
Kentucky, Cold-blast	25.00 @ 30.00

W. B. BELKNAP & Co., Iron and Steel merchants, Nos. 113 and 115 West Main street, under date of Dec. 2, report business in Manufactured Iron and heavy hardware rather quiet during the past week. This may be only a temporary lull, or it may be the beginning of that falling off in trade which in ordinary seasons always marks the months of November and December. Prices, however, are well maintained, and the mills of the Ohio Valley, below Pittsburgh, are, as a rule, still behind orders. Certainly current production is not yet in excess of current demand.

ST. LOUIS.

Specially reported by Messrs. SPOONER & COLLINS, Iron Commission Merchants, 217 North Third street, under date of Nov. 29: Since our last report there has been a slight improvement in the Pig Iron business. For some grades of Iron there is considerable demand, though not as much as we think there will be after the first of January. Our market generally is only fair. Prices remain as last reported, with an upward tendency. Old Rails are stiff at prices named and hard to secure. We quote same as last.

COLD-BLAST CHARCOAL—All Numbers.

Hanging Rock	4 mos.	$23.00 @ 25.00
Tennessee	4 mos.	22.00 @ 23.00
Kentucky	4 mos.	22.00 @ 23.00
Missouri	4 mos.	22.00 @ 23.00
Georgia	4 mos.	22.00 @ 23.00
Alabama	4 mos.	22.00 @ 23.00
Assorted Bar Iron		1.95 rates.
No. 1 Wrought Scrap	℔ cwt.	.90 @ ....
Heavy Cast Scrap	"	.65 @ ....
Light " "	"	.40 @ ....
Old Rails, ℔ ton	4 mos.	20.00 @ 21.00
Old Car Wheels, ℔ ton	4 mos.	17.00 @ 18.00

	No. 1.	No. 2.	Mill.	White and M'l'd.
Missouri Stone Coal	$21.00	$20.00	$19.00	$17.00
Missouri Charcoal	20.00	19.00	18.00	....
Tenn. Charcoal	20.00	18.50	17.50	....
Tenn. Coke, very soft and strong	20.00	19.00	17.00	16.00
Hang. Rock Charcoal	22.00	20.00	19.00	....
Hanging Rock Cold-short	....	....	....	....
	Extra		B	
Alice Hanging Rock Coke	No. 1.	No. 1.	No. 1.	No. 2.
Moxahala Blackband Ores	22.00	21.00	19.50	19.00
	21.00	20.00	10.50	18.00

BALTIMORE.

Mr. W. N. WYETH, Iron and Steel Merchant, 46 and 48 South Charles street, reports us the following prices under date of Dec. 2: There is no new featare to note in the general condition of this market for the past week. Trade rules fair at unchanged values, which are firm and hardening.

Refined Bar Iron, 1 to 6 wide by ⅛ to 1 thick	℔ lb.	1.85 @ 2 ¢
Refined Bar Iron, 1 to 4½ wide by 1½ to 2 thick	"	1.85 @ 2 ¢
Refined Bar Iron, ¼ to 2, Round and Square	"	1.85 @ 2 ¢
Hoop iron, 1½ wide and upward	"	2½ @ 2¾¢
Band Iron, from 1¼ to 4 in. wide	"	2¾ @ 3½¢
Horse-shoe Iron	"	3 @ 3½¢
Norway Nail Rods	"	4¼ @ 5¼¢
Black Diamond Cast Steel, Flats, Squares and Octagon, ordinary sizes	"	13 @ 14 ¢
Machinery Steel	"	8 @ 10 ¢
ast Spring Steel	"	6 @ 6½¢
Homogeneous Steel Plate	"	7 @ 7½¢
Common Horse Nails	"	13 @ 16 ¢
R. R. Spikes, 5½x9-16		2¾¢ @ 2¾¢
Perkins' Horse shoes, ℔ keg of 100 lbs.		$3.62½
" Mule shoes		4.62½

	10	9	8	7	6
Putnam Horse Nails ℔ lb	18	19	20	21	23¢
Globe Horse Nails ℔ lb	18	19	20	21	23¢

Less list discount to the trade.

Messrs. R. C. HOFFMAN & Co., Iron and Commission Merchants, No. 23 South Frederick street, report the Pig Iron market as follows, under date of Dec. 2: The Iron market remains unchanged, with fair demand. We continue last quotations, viz.:

Baltimore Charcoal Pig	$26.00 @ 28.00
Virginia " "	26.00 @ 28.00
Anthracite No. 1	19.00 @ 20.00
" No. 2	18.00 @ 19.00
" No. 3	16.00 @ 17.00
" Mottled and White	13.00 @ 14.00
Charcoal, C. B. Blooms	50.00 @ 52.00
" " Billets	52.00 @ 55.00
Refined Blooms	43.00 @ 45.00

CINCINNATI.

Messrs. E. L. HARPER & Co., under date of Nov. 30, write us as follows: The past week has developed a good demand, with no noticeable change in prices. The fall trade has held out well to the end of the season, and although this month may be expected to be less active, it is not probable that stocks will increase to any large extent.

HOT-BLAST FOUNDRY.

Hanging Rock C. C., No 1	$21.00 @ 22.00
" C. C., No. 2	20.00 @ 20.50
Alice, No. 1 Extra, I. M.	21.00 @ 22.00
" No. 1 " N. O.	20.00 @ 21.00
" No. 1, N. O.	20.00 @ ....
Hanging Rock Coke and S. C., No. 1	18.00 @ 20.00
" " S. C., No. 2	16.00 @ 18.00
Virginia Coke, No. 1	19.50 @ 20.00
" No. 2	17.50 @ 18.00
Shawnee S. C., No. 1	18.50 @ 19.50
" S. C., No. 2	16.00 @ 17.00
Hocking Valley S. C., No. 1	19.00 @ 19.50
" S. C., No. 2	16.00 @ 17.00

FORGE IRONS.

Hanging Rock, No. 1 C. C.	19.00 @ 19.50
Hanging Rock, No 1 Coke	16.50 @ 17.00
Longdale, No. 1 Coke	17.00 @ ....
Ala. and Tenn. No. 1 C. C.	17.00 @ ....
Red-short, No. 1 Coke	18.50 @ 19.50
Cold-short, No. 1	15.50 @ 16.00
Old Rails, prime	cash, ... @ ....

CAR WHEEL AND MALLEABLE.

Hanging Rock C. B.	30.00 @ 31.00
Cherokee C. B.	28.00 @ ....
Southern and Western Brands	28.00 @ 30.00

RICHMOND.

Mr. ASA SNYDER, Iron Merchant and Furnace Agent, writes as follows under date of Dec. 2: A fair demand for Foundry and Forge Pig Irons. Receipts of about 600 tons for consumption the past week. Old Rails and Wrought Scrap continue active at quotations:

American Scotch Pig Iron	$21.50 @ 22.50
Anthracite, No. 1	19.00 @ 20.00
" No. 2	18.00 @ 19.00
" No. 3	17.00 @ 18.00
" Mottled	14.50 @ 15.50
Coke, No. 1	19.00 @ 20.00
" No. 2	18.00 @ 19.00
" No. 3	16.50 @ 17.50
Va. Cold-blast Charcoal, Cold-short	20.00 @ 23.00
Va. " " Neutral	27.00 @ 28.00
Va. Warm-blast " Cold-short	18.00 @ 21.00
Va. " " Red-short	17.00 @ 18.00
Old Rails	17.00 @ 18.00
Wrought Scrap No. 1	16.00 @ 17.00
Cast " (machinery)	15.00 @ 16.00
Richmond Refined Bar Iron	2c. @ ....
Horse Shoes per keg	... @ 4.00
Mule " "	.... @ 5.00
Old Dominion Nails, Standard Size, ℔ keg	2.25 @ ....

Freights to Philadelphia, $1.40 per ton of 2240 lbs., by sail.

Freights to New York, $1.60 per ton of 2240 lbs, by sail.

FOREIGN.

FRANCE.

(Moniteur des Interets Materiels.)

PARIS, Nov. 17, 1878.—*Metals.*—The French metal markets have been remarkably active during the week, stimulated by the accounts from England and Holland, where confidence in the immediate future of metals is apparently becoming stronger daily. *Copper.*—There has been quite a buoyant and advancing market at Paris. While this improvement has been going on, consumers have also operated more readily, and prices close as follows: Chili Bars, deliverable at Havre, 160 francs the 100 kilos.; Common ditto, 155; Ingots and Slabs, 165; Best Selected English, 165, and pure Corocoro Ore, 160. Havre is quiet and nominal. Marseilles continues to look up. They quote Spanish in slabs, 150; Red Tokat, 135; small Refined Ingots, 175; Sheathing, 187.50; Bolts, 195, and Yellow Metal Sheathing, 180. *Tin.*—There has been a vigorous rebound here. The question naturally suggests itself whether this improvement, due to speculation only, can be sustained very long. We close here as follows: Banca, 172.50; Billiton, 170; Straits and Australian, 165, and English, 165. Marseilles has taken quite a start, rising 15 francs at a bound. They now quote Banca 165 francs the 100 kilos.; Straits, 157.50; Billiton, 157.50, and English, 170. *Lead.*—This metal perseveres in its attitude of indifference and weakness, and we are again lower at Paris. We quote here, French, Belgian and German, 38.50 francs the 100 kilos., and Spanish and English, 38. At Havre Soft Spanish First Fusion sells at 41 @ 41.50. At Marseilles Lead is quiet, yet firm, closing as follows: First Fusion Soft, 37 @ 37.50; Second ditto, 36.50; Sheet and Pipe, 42, and Shot, 42.50. *Spelter.*—Business in this metal has dwindled down to a mere trifle, but prices have declined no further here, being 46 francs the 100 kilos. for whatever sort, and either deliverable here or at Havre. Silesian commands 46 @ 47 francs at Havre. Marseilles has declined; they quote Vieille Montagne and Southern Sheet, 50 francs, less 3 %, and Old Remelted in slabs, 42. *Iron.*—There is some complaint that orders have become scarce, but this abatement in the demand is not surprising at this advanced season when most dealers and manufacturers have replenished stocks. Aside from this the damp weather puts a stop to building, and the demand for Iron for architectural purposes has pretty much ceased. In Sheet Iron little transpires. A moderate demand is noticeable for Swedish and Lancashire Iron. In the Champagne the Committee of Forges has handed to the Parliamentary Committee of Inquiry its wishes with respect to the basis on which the future Iron tariff should rest. All articles connected with the stove trade are selling with great ease. Orders for common Iron are scarce, and the few given are limited very low. A reduction of wages seems to us inevitable. The Wire mills are not in a prosperous condition. At the North the depression, so far as prices are concerned, is, if anything, getting worse. Thus Merchant Iron has been sold there at the unprecedentedly low figure of 147.50 francs. These are starving rates. None but the very large concerns are in a somewhat tolerable condition, for they can work cheaper than the smaller makers without ruining themselves outright. In the Meurthe and Moselle affinage Pig Iron is paid 57 @ 58 francs. *Coal.*—Large amounts of Coal are arriving just now at Paris from all quarters in order to stock the market with Coal for family use. The manufacturers of the city still hesitate in replenishing their requirements, evidently expecting to do better shortly, as freights are just now tending downward.

BELGIUM.

(Revue Universelle).

BRUSSELS, Nov. 17, 1878.—*Iron.*—Business for local consumption in Belgium is still very much restricted, the demand continuing slack. The only vitality still being kept up is due to the government ajudications, not very active at present, yet they always keep a certain number of establishments tolerably busy. The lack of local demand thus compels makers to again bestow more attention upon the export trade. We thus hear that Messrs. Pierard Bros. & Co., of Montigny-sur-Sambre, have just secured the furnishing of 800 tons Iron Rails of 25 kilos. to the meter for Italy, and the Dyle works have obtained an order for 80 passenger cars for the Madrid-Saragossa-Alicante Railroad, both jobs being at remunerative figures. But commands of the kind are in reality of little amount when we come to consider that the Cockerill Society alone possesses a rolling mill train capable of turning out 2000 tons Steel Rails per week, not to speak of the many other producers in Belgium, who, if not as important as the Cockerill concern, are still among the largest on the Continent. This shows that there is ground enough for uneasiness as regards the near future, and that some solid revival is very much to be hoped for. Charleroi and neighborhood have had the honor of an industrial visit from Messrs. Wm. Bell & Forster. They called at the Thy-le-Chateau works with the special purpose of examining the Ponpard furnace; furthermore the Marcinelle works at Montigny, and the Chatelet rolling mills. The Dutch government has decreed that all railway material intended for the Dutch East Indies is to be inspected by a technical bureau attached to the department of the colonies at the Hague, instead of being passed upon only on arrival in the East. *Coal.*—For industrial purposes there is little doing, but for household purposes there is a fair amount of activity, and a slight improvement in values has been observable, now stopped through the competition of sellers.

GERMANY.

(Borsenhalle.)

HAMBURG, Nov. 16, 1878.—*Metals.*—The German metal markets have remained unexcited, despite the advance in England, Holland and France. This is all the more remarkable as it is well understood that dealers and consumers hold comparatively light stocks, and that the posts hold but moderate ones. The reason for this apathy has to be searched for, we believe, in the fact that there are at the present day no prominent speculators in Germany in the metal branch, if we except the Spelter operators at Breslau, and their dealings are usually carried on with great secrecy till it suits them to show their hands. *Copper* has mostly been quiet, and little improvement can be reported, but toward the close a better feeling is manifesting itself here, and some business seems to be going on. We quote as follows: Drontheim, 69 @ 70 marks the 50 kilos.; Minnesota, 85; and English Tough, 66 @ 67. Berlin is steady. They quote English and Australian, 66 @ 71 marks, and Mansfield, 70.50 @ 71. *Tin* has been slowly tending upward. Berlin now quotes Banca 69.50 @ 70 marks the 50 kilos., and English, 66.50 @ 67. We quote here: Banca, 68 @ 70; English, Common, 63 @ 69; and Refined, 70. *Lead* has been stagnant. Berlin quotes Tarnowitz, Hartz and Saxonian, 16.50 @ 17 marks the 50 kilos., while here we have remained at the following rates: English Pig, 18 @ 18.50; ditto Sheet, 18.50 @ 19; German Pig, 17 @ 17.50; and Spanish, as per brand, 18 @ 19.50. *Spelter.*—Hardly anything transpires in this metal in Germany at present. Berlin is steady at 18.25 @ 19 marks the 50 kilos. for good Silesian, while here, on the spot and to arrive, we have remained uniformly at 18.50 marks.

HOLLAND.

(Koch & Vlierboom.)

ROTTERDAM, Nov. 19, 1878.—*Tin.*—Great firmness prevails in this market, Banca having brought 38.50 @ 39.50 guilders the 50 kilos., and Billiton, 38 38.75. The Netherland Trading Society has announced its intention of selling at public auction on the 26th instant 23,800 slabs Banca Tin. Prices having risen considerably during the past four weeks, it will not be without interest to note the changes which Banca Tin has been subject to during the past nine years:

	1870	1871	1872	1873	1874	1875	1876	1877	1878
Jan.	1..65	77	87½	85¼	70	57¾	50	45	40¾
Feb.	1..64½	78	86	87½	70	56¾	50½	43½	40
Mar.	1..70	77¾	85	84	62	54	50¼	43¼	40½
April	1..75½	76½	93	87	53	51½	50	42¾	40
May	1..78¾	76¼	96	84	57	50¾	49	42½	39½
June	1..78½	76	95½	80	58½	50	45½	42½	39½
July	1..78½	79¼	94½	83½	60	50¾	46¼	42½	39¼
Aug.	1..69	80½	90	79¾	56½	48¾	44	41¾	39½
Sept.	1..75	80	93¼	79	57	51	43	40½	37¾
Oct.	1..74½	80½	94¼	74½	56¼	52¾	42½	40¾	35¾
Nov.	1..73½	81¾	92	72½	58	52¾	44½	43	37¾
Dec.	1..73½	88	87	67½	58¾	51	44¾	41½	....

EAST INDIES.

(Schmidt, Kustermann & Co.)

PENANG, Sept. 30, 1878.—*Tin.*—The market during the past fortnight has been quiet. There have been taken for England 700 piculs at $17.25 per picul, and 2500 for India and China at $17.25 @ $17.50. The closing price is $17.25. The stock in bazaar amounts to 3000 piculs, none of which will be placed on the market unless the latter improves materially.

Aitken, Spence & Co.

COLOMBO, Sept. 27, 1878.—*Plumbago.*—Nothing has transpired in this mineral, which remains dull and nominal. Freights to London 35/ per sail and 40/ per steam. There have been shipped since Oct. 1 to England 33,780 cwts.; to the United States, 23,724; to Marseilles, 225; to India, 264, and to Australia 106; together, 64,099 cwts. Last year during the same period the shipments to the United States alone amounted to 74,532 cwts., and to all quarters, including America, 108,033 cwts., against 128,324 in 1876 and 90,641 in 1875. *Freights* are weak. *Exchange* closes weaker also at 1/8¼ @ 1/8¾.

(Gilfillan, Wood & Co.)

SINGAPORE, Oct. 16, 1878.—*Tin.*—The market continues weak with very little demand for Europe and America. For the Eastern markets there has been some inquiry, stimulated by the recent decline. About 230 tons have come to market during the fortnight, of which European buyers have taken only 13 tons at $17.60 and 30 tons at $17.50 per picul. The shipments from Singapore alone to the United Kingdom during the first nine months have been 13,995 piculs, against 14,389 in 1877; 33,127 in 1876; 29,130 in 1875; 20,264 in 1874, and 20,177 in 1873; to the United States, 30,323 in 1878, against 36,057 in 1877; 21,062 in 1876; 35,442 in 1875; 27,844 in 1874, and 27,218 in 1873.

(Dummler & Co.)

BATAVIA, Oct. 10, 1878.—*Tin.*—There will be sold at auction on the 14th inst. 10,000 piculs Billiton Tin. Imported goods in the metal line are very dull and without quotable transactions. *Coal.*—Owing to the loss of the Ary Scheffer another cargo of West-Hartley has been sold at 19 guilders. In Australian nothing has been done. *Exchange* is steady at 11.92½ @ 11.95 guilders per £ on London

Our English Letter.

Review of the British Iron, Steel, Met and Hardware Trades.

(From our Regular Correspondent.)

LONDON, ENG., Nov. 18, 1878

THE WEEK

has been without any events of other than ordinary interest in respect of the allied industries represented by *The Iron Age*, and has in no sense been other than purely stale flat and unprofitable to everybody. There has been *some* business done, as a matter of course, but I am quite sure that a very momentous proportion of the turnover has been performed without leaving a satisfactory balance in the pockets of those who have been concerned therein. Sober, earnest persons who are not wont to complain, even in very dull times, are at length growling, and declare that at no time during the past fifty years has business been so generally and so decidedly bad. In my goings and comings among commercial men here and there I hear

TWO CLASSES OF COMPLAINTS,

one being that "there is really nothing whatever doing," and the other "we are certainly doing *some* business, but we are virtually getting little or nothing out of our transactions." The former of the two is chiefly the lamentation of the smaller and newer firms and concerns, and the latter that of establishments which have been in existence many decades—some several centuries. Competition on an unprecedented scale crowds out the new people and causes the old ones either to altogether forego booking orders or to accept them at the feeble quotations of the time being, simply and solely for the sake of keeping together the connection for better and more prosperous future periods. As a strict matter of fact and of history, the iron trade of Great Britain has been kept together and foreign competition nullified by this process during more than one former chaotic period. The Crawshays, Fothergills, Bairds and other metallic millionaires bridged over many a gaping gulf in the days when trades unions and foreign tariffs were not, and their successors are at this moment following out the same line of policy, although they are making much less stock than used to be the case, and are also making their workmen share the "winter of their discontent," instead of keeping them on, as was formerly the case. That

THE SITUATION IS DESPERATE,

however, cannot be honestly denied, seeing that all our accounts from the provinces show immense numbers of idle furnaces, unused machinery and plant, constant additions to the already enormous stocks, a wretchedly poor demand, and an amount of competition which causes venders to book orders at almost any price which the purchaser who has the money in his pocket likes to name. Looked at from a financial

standpoint, this is bad enough, but when one scans the prospect from the humanitarian point of view the outlook is truly alarming and very sorrowful. The most recent reports from all the leading iron-making districts unite in detailing distress of the deepest kind among the unfortunate ironmakers and their families. In South Wales, Monmouthshire, South Staffordshire, South Yorkshire, Lancashire and parts of Scotland and Cleveland the privations of all classes of artisans are already piteous, and as the iron hand of winter closes upon us their plight will necessarily become worse and worse. At Sheffield and Rotherham—both, as you will remember, in South Yorkshire—last year's relief committees have been revivified and are distributing soup, bread and certain kinds of wearing apparel. The remnants of the former funds will, however, be speedily exhausted, and public benevolence will perforce be appealed to in order to raise further means. I can personally testify to the excessively bad state of affairs in several places. While at Sheffield the other day I passed along streets in which the empty and deserted dwellings might be counted by the hundred—literally. Pretty much the same state of things is in existence among the coal miners, whose prosperity or poverty is necessarily contemporaneous with and dependent upon the current condition of the iron and steel trades. Under these unprecedented circumstances some among us ask if

ENGLAND'S SUN IS SETTING,

or whether the present period is but a deep valley whence we shall shortly emerge to climb prosperous summits of greater hight than ever. The optimists count many good and great authorities in support of their views, and profess to regard the matter with that immovable equanimity and coolness which is derivable from experience only. They even give us statistics to prove that the stagnation has fallen in due and regular order, and that it will have wholly passed away by the beginning of 1881 or thereabouts. The pessimists look with scorn and contemptuous loathing on any such haphazard "guesses," and expend a vast amount of Cassandra-like prophecy in order to convince us and the world at large that we, as a nation, are now in our dotage, and that the commercial sway we have so long enjoyed is gradually dwindling. They may be wrong—I am not presuming to occupy the seat of judgment—but even if so they give us an abundance of reasoning and not a few solid facts in support of their theories. They point to our declining exports and imports as contrasted with the steadily growing foreign trade of France, Belgium, Germany and the United States, and clinch their cry with portentous comparisons on the subject of free trade *versus* that abhorred protection which is so rapidly receiving the adhesion of all, or nearly all, other countries. They discourse learnedly, and not unwisely, on the current British folly of the neglect of commerce by the best blood and knowledge of the highest families here, and pepper us with volumetric statistics, whereby they prove to utter demonstration that our population is increasing and our natural wealth decreasing with such enormous strides that the fate of Babylon, Greece, Nineveh, Thebes, Egypt, Rome, Carthage and other notable historic milestones surely and unavoidably stares us in the face. I do not venture to refute these dismal prophecies; indeed, I am hopeful and sanguine enough to suppose and hope that the operations of time and patience—as to which we have a neat little proverb—will bring us round, and that in our time, at least, we shall not be compelled to put up the national shutters.

SCOTCH PIG IRON,

like pretty nearly everything else, remains in a stagnant condition, and such sales as are being sluggishly effected are all recorded at lower prices than ever. A warrant broker came to grief last week with a deficiency of about £3000. Already it is estimated that 150 failures have occurred in Scotland, solely owing to the bank stoppage. There are at this date 199,798 tons of pig iron in Connal's stores—an actual decrease of 321 tons during the week, a circumstance which is scarcely to be accounted for by the reduction of the number of furnaces in blast to 87. Writing from Glasgow, on November 16, James Watson & Co., said: "Our market for Scotch pig iron has been quiet during the past week, the price of warrants gradually receding from 43/6, cash, on Monday until 43/3 was accepted to-day, closing with buyers at that price and sellers at 43/4 ₱ ton. Shipments last week were 8547 tons, as compared with 8523 tons for the corresponding week of 1877."

Gartsherrie No. 1 is 51/; No. 3, 47/; Coltness No. 1, 52/; and No. 3, 47/6; Glengarnock No. 1, 48/6; and Eglinton No. 1, 44/6, with a shilling less for No. 3.

OFFICIAL CLEVELAND STATISTICS

just issued show that during the month of October there were 93 furnaces in and 72 out in that district. The make for the month was 167,160 tons, including 137,302 tons of ordinary and 29,858 tons of hematite and spiegeleisen. You will, of course, know that the West Coast hematite district proper is not included in this return. The foreign shipments from Middlesboro' in the month were 28,500 tons, and coastwise, 33,718 tons. The total stock in makers' hands on Oct. 31 was 163,609 tons, besides 86,898 tons in public stores and 40,187 tons in makers' own stores. At Bolokow Vaughan's Eston Works last week the almost, or perhaps wholly, unprecedented quantity of 1700 tons of steel rails were rolled. How is that for high?

A WIRE-ROLLING FEAT

is reported as having been performed at the works of the Pearson & Knowles Iron Co., Warrington, from one of Bleckly's four-high wire rolls: "The turn-out, with two heating furnaces in 9½ shifts of 10 hours each, reached the large quantity in one week of 236 tons 15 cwts. 2 qrs. of No. 4 (three-sixteenths full) wire rods, ranging in weight from 50 to 70 lbs. per rod, the highest turn's work being 24 tons 18 cwts., and the lowest 20 tons 4 cwts. 3 qrs. The total production of this one mill during the last fortnight was 432 tons 12 cwts. of No. 4 rods." Is Mr. B. C. [illegible] with anywhere about?

FROM SHEFFIELD

I have so little news that I really think I shall skip the district this week; indeed, I suppose the Sheffielders don't care much about business just now, seeing that they have gone mad anent the capture of a murderer who shot an engineer there a couple of years ago, and are gaping at and swallowing all the thousand and one ingenuities poured down their throats wholesale by London correspondents, "our own reporters," and other more or less clever personages. Had it not been for this cheerful excitement I'm afraid the good denizens of Steelopolis would have died of *ennui* ere now. As it is they have my best and kindest wishes for their early recovery, both mentally and commercially.

FROM STAFFORDSHIRE

the current tidings are quite as gloomy as at any time of late. Very severe economies are the rule, with promising results in some instances. As a case in point I may mention the Pelsall Iron & Coal Co., the directors of which report a credit of £3783 on the year's working, as compared with the loss of £8543 the previous twelve months. The Darlaston Iron & Coal Co., on the other hand, have decided to raise an additional £65,000. The iron trade of the county is very bad, and there is much distress in all directions. The

BIRMINGHAM INDUSTRIES

are rather variously engaged, some being busy and others slack. In no one case, however, is there any suspicion of much profit, while in not a few the financial Damoclean sword is ominously oscillating overhead. A moderate amount of export business is in course of execution, chiefly for Cuba, South America, Australia, South Russia and India. Tinware is selling well for New Zealand, and patent electro-plated goods for France and elsewhere.

AMERICAN AND BELGIAN COMPETITION

in many kinds of hardware is still much talked of, and in not a few instances pertinent examples of its persistence and force are afforded. The *Ironmonger* of Nov. 16 gives a particularly prominent case in point, on the authority of a leading firm of merchants. The story runs thus:

"We sent out to China a parcel of English-made rules, manufactured for us by a leading firm in the town. They were bitterly complained of on account of their general inferiority to American goods in get-up, finish, &c. Ultimately they were all returned to us from China, the suppliers refused to take them back, and we sold them by auction, to get rid of them, at a heavy loss. Our foreign firm, in returning them, said it would be the last order for that class of goods we should get, as all the orders in future would go to the States. At the present time we are shipping largely to China from the States such goods as cut nails, coal shovels and scoops (a kind of shovel, not a coal vase), cotton duck, pumps and small fire engines, and all our information goes to prove the American goods are preferred. In one of our late letters from China we are told that the Belgian makers have succeeded in so well imitating the "get-up" of English nail rods, and sell so much cheaper, that their goods are beating the high-priced English articles out of the market. One Belgian firm has, after much perseverance, got its brand so well known that the natives buy it readily, and say the quality can be depended upon."

As an addendum to this remarkable statement, *The Ironmonger* gives the list prices of American and English rules and levels of about the same qualities and sizes. The statistics are too long for quotation here, but I may say that as a general thing the English rules appear the cheaper and the American levels.

THE LONDON CUTLERS' EXHIBITION

will take place next May, and will, I learn, be confined to British products of that ilk only. No chance, therefore, for cousin Jonathan this time. In

SOUTH WALES AND MONMOUTHSHIRE

iron is quiet, although steel is selling rather more lively. Included in the list of recent shipments was a lot of 500 tons of rails to New York by Dowlais, and 100 tons iron to same port by Mr. Edwards, besides a cargo of spiegel to Philadelphia from Newport. The ore imports are heavy.

METAL MARKETS.

I take the following from Sanders Bros.' monthly iron and metal circular, London, Nov. 13:

COPPER.

Our present quotations are:

	£. s. d.	£. s. d.
Ores and regulus, per unit	0 11 0 @	0 11 6
Chili bars, per ton	59 0 0 @	60 0 0
English tough, per ton	64 0 0 @	0 0 0
" selected, per ton	66 0 0 @	0 0 0
" manufactured, per ton	69 0 0 @	0 0 0

Compared with same date 1877:

	£. s. d.	£. s. d.
Ores and regulus, per unit	0 12 0 @	0 12 6
Chili bars, per ton	65 0 0 @	66 0 0
English tough, per ton	70 0 0 @	71 0 0
" selected, per ton	72 0 0 @	73 0 0
" manufactured, per ton	76 0 0 @	77 0 0

	Month ended Oct. 31.		
	1876.	1877.	1878.
	Cwt.	Cwt.	Cwt.
Exports to U. S. unmfd	....	....	....
" other countries	21,686	23,356	23,786
" U. S. manuf'd	26	30	...
" other countries	21,535	19,782	24,858
	Ten months ended Oct. 31.		
Exports to U. S. unmfd	30	100	....
" other countries	195,876	178,991	307,740
" U. S. manuf'd	269	951	773
" other countries	183,793	185,257	202,477

On the 19th ultimo the failure was announced of a West Coast house, largely engaged in the copper trade, and the market became entirely disorganized. Transactions occurred in bars from £57 down to £54, followed by a sharp reaction up to £58. 10/ @ £59, with again a fall to £57, followed by a slow improvement up to our quotations as above. The charters for the second half of October were advised as 2600 tons, with a fall in West Coast prices to about our present level here. The total stocks on the 1st of November were 51,553 tons, against 52,053 tons same date last month, being a decrease of about 500 tons on the month. The low price for copper has attracted the attention of speculators to some extent, and moderate quantities have been purchased for the rise, while on the other hand the large stocks and depression in the volume of business have prevented consumers from buying freely, and the early future seems generally to be considered a rather uncertain one. English copper has not fluctuated to the extent visible in Chili sorts. Best selected has been sold as low as £63; tough, £62; but the general quotation throughout has been about £2 over the lowest point, at which consumers buy very sparingly, alleging a decided falling off in orders, necessitating in some instances their working short time, a course they have not had to resort to for months past. There is certainly room for an important rise in this article, and notwithstanding the general depression in business, one always comes back to the fact that copper is at present at an extremely low price. Manufactured is in slow demand again, with only moderate business passing at £68 for India sheets, £69 for strong copper.

SPIEGELEISEN.

We quote for 20 per cent. English £4. 17/6 per ton, f. o. b. Makers are getting near the end of their orders, and show an inclination to accept rather lower prices, demand still being quiet. Ferromanganese is lower in price again, with moderate demand and keen competition, each small lot being a matter of special negotiation.

LEAD.

Our present quotations are:

	£	s.	d.
WB per ton	16	0	0
LB "	15	5	0
Ordinary brands "	14	15	0

Compared with same date 1877:

	£	s.	d.
WB per ton	20	10	0
LB "	20	5	0
Ordinary brands "	19	15	0

	Month ended Oct. 31.		
	1876.	1877.	1878.
Exp'ts to United States tons.	2	102	31
" other countries "	2,690	4,461	3,721
	Ten months ended Oct. 31.		
Exp'ts to United States tons.	1,261	2,905	221
" other countries "	28,721	33,355	30,342

Lead has fallen about £1 on the month, the arrivals being extremely heavy and the home demand dull and unsatisfactory; stocks continue to increase, and the prospect is anything but a cheering one.

REGULUS OF ANTIMONY

£49, compared with same date last year £48 @ £49. Rather more business doing for the States and the Continent, but for fair quantities at a slight reduction from our quotation.

TIN.

Our quotations to-day are:

	Now. £ s.	Same date, 1877. £ s.
English L. & F. Ingots per ton	68 0	74 0
" Bars in Barrels "	69 0	75 0
" Refined "	70 0	76 0
Straits "	64 10	68 0
Australian "	64 10	68 0

	Month ended Oct. 31.	
	1877. Tons.	1878. Tons.
Exports to United States	2,647	636
" other countries	9,206	10,643
	Ten months ended Oct. 31.	
Exports to United States	27,683	7,544
" other countries	79,031	99,273

The imports of tin into England have been:

Month ended Oct. 31.			Ten mos. ended Oct. 31.		
Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
1876.	1877.	1878.	1876.	1877.	1878.
21,004	25,405	15,463	268,526	248,512	286,481

Tin will be observed to be almost the only exception in a gloomy list of metals. Friends have come to the rescue at last; very large speculative purchases have been made, and the rise in price will be observed to be of a very important character. The reaction from depression and forced selling to determined buying of everything offering in any position has, for the time, placed the control of the market practically in the hands of one firm. Any prognostications with regard to the future, therefore, are of course entirely impossible. Figures show a not important improvement, as will be observed. We shall see later whether this continues, now that the tin plate trade have commenced the curtailment of production by working only four days a week. English tin has followed foreign with, however, only moderate business, as the advance was too quick for general buyers. The following statement shows the present position of tin:

	Sept. 1, 1878. Tons.	Oct. 1, 1878. Tons.	Nov. 1, 1878. Tons.
Foreign Tin in London	10,111	9,999	9,296
Banca and Billiton in Holland	2,883	3,337	2,914
Stocks	12,994	13,336	12,210
Banca in hands of the Dutch Trading Co. unsold	1,528	977	1,112
Foreign Tin afloat for Europe	3,350	3,092	3,832
Total	17,872	17,405	17,154

SPELTER.

Ordinary Silesian £17. 5/, compared with 19/5 same date last year. Spelter, like most other articles, has had an important drop in price, and we close with rather light demand of a hand-to-mouth description, and dull market.

TIN PLATES.

	Now.	Same date 1877.
I. C. Coke, ordinary brands	15/	17/
I. C. Coke, best brands	16/6	18/6
I. C. Charcoal, ordinary br'ds	18/6	19/
I. C. Charcoal, best brands	19/6	20/

	Month ended Oct. 31.		
	1876.	1877.	1878.
Exp'ts to United States tons.	7,243	9,972	11,190
" other countries "	3,613	4,607	4,195
	Ten months ended Oct. 31.		
Exp'ts to United States tons.	74,578	83,342	87,782
" other countries "	35,088	39,856	39,983

The large buyers during the past month have apparently made up their minds very speedily to meet makers half way between their pretension of 15/ a box for cokes, and buyers' limit of 14/, as intimated in our last, and a large business has been done at 14/6, and even at 14/9, and we close with a steady market; general quotation being 15/ for coke plates, with occasional orders passing at 14/9. This has been chiefly on American account, Continental purchasers being much slower to believe in anything like an improvement in prices. Business prospects generally too in the States appear to be improving, while on the Continent the late stagnation continues, partly induced by political apprehensions which tend to restrict all commercial transactions. Charcoal Plates are steady at 18/ @ 18/3 for Tin, 1/3 @ 1/2 × specification. Ternes 16/ 14 × 20, 32/6 28 × 20 grade of S. T. P., &c., and do not appear to have been dealt in at all to the same extent as cokes.

Steel Castings.

Almost from the time of the discovery of cast steel by Huntsman attempts have been made to utilize it as a material for castings. Its great superiority in strength over cast iron permits a large reduction in weight, and when used as a part of a machine there was a consequent reduction in loss of power, while its forging and welding qualities made it available for many purposes for which cast iron cannot be employed. The chief obstacles in the way of its successful use have been the difficulty of making it true to pattern, the liability to blow-holes, with the resulting loss of strength and a want of uniformity in the product. These difficulties were for a long time so imperfectly overcome that steel castings have in many cases had the reputation of being very unreliable, and parties who had once used them were often very strongly disinclined to risk them again. These difficulties have been very fully overcome at the Pittsburgh Steel Casting Works, and it is claimed that absolute uniformity of quality has been obtained, while the strength has been greatly increased. The steel is made as free from blow-holes as an ordinary iron casting, while the shapes are made perfectly true to pattern. The only forms that cannot be made are those having a long, thin section, though if these are braced in cross sections they can be cast. This result has been attained by the use of Hamsworth's patents as a basis, and the expenditure of no little time and a good deal of money.

The works of the Pittsburgh Steel Casting Co. include a fireproof main building of brick, with an iron roof, 256 by 122 feet, in which are contained the crucible furnaces, annealing furnaces, welding and heating furnaces, and hammers, and in which all the castings are made. There is also a gas-producing house 40 by 50 feet, a drying-oven house 50 by 86 feet, and a pattern shop 40 by 25 feet. There are two 24-pot Siemens generative furnaces, each pot holding 88 pounds of metal and each furnace capable of making six heats in twenty-four hours. The present capacity of the works is therefore 288 crucibles of 88 pounds each, or more than twelve tons per day. The works have two steam hammers, one tilt hammer, lathes, planers, &c. The stock used in the manufacture of these castings is the same as that used in an ordinary crucible steel works. The manufacturers claim that the castings can be made of any grade, from the softest cast steel to the hardest, and like any other cast steel they can be drawn out under the hammer into any shape into which wrought iron may be drawn, and welded as perfectly as any kind of steel; and by their patent methods of molding they are enabled to make their castings as smooth and true to pattern as the smoothest iron castings. They also claim that all their castings have a tensile strength of not less than 65,000 pounds per square inch, some of them testing as high as 90,000.

Steel castings may be used as a substitute for wrought iron forgings, and replace cast iron in such work as general rolling mill castings, pinions, dies and bevel and spur wheels. The company have recently cast a 2700-pound bevel gear for the Pacific Mills, an undertaking of considerable importance, as all the metal must be melted in small crucibles. The company have made in the last seven years 220,000 plow points of this material; they also make frog points and crossings, cranks and a variety of railroad work. The shrinkage of cast steel is somewhat greater than that of cast iron, and it is necessary to allow 5-16ths of an inch to the foot for shrinkage.

Peck's Patent Drop Press.

We have recently had our attention called to several drop presses made by Mr. Milo Peck of New Haven, Conn. In looking them over we were much impressed with several features in their operation which are frequently neglected by manufacturers in setting up a stamp or drop press. Mr. Peck, who died some two years ago, was one of the earliest manufacturers of drop presses in this country, and his presses are well known both at home and abroad. He early discovered and applied in practice the principle that a heavy weight falling a short distance was vastly more effective in changing the shape of an object than a light weight falling a greater distance, even when the weights and distances are so proportioned that the work is equal in each case. The fact was long ago recognized in pile driving that a light drop falling a long distance would shatter the head of a pile without moving it, while a heavy drop falling a short distance would drive it home without shattering. As an example we may take some figures published by Mr. Peck in regard to the force of weights falling from a hight. Thus 1 pound falling through 3 feet will be equivalent to 61 pounds acting through the distance which the anvil, or work, yields to the blow, or, as it would be more commonly put, resting upon the work. Now, 60 pounds falling through 1 inch would produce almost precisely the same effect, so far as the figures go, but it would be vastly more effective in shaping work either in forging or stamping. For a crusher the high drop would be best. The reason for this is found in the difference of time during which the work is done. In one case the drop strikes the metal at the rate of some 13 feet per second, but with the short drop only 2⅓ feet. Now, as metal behaves under very heavy pressures very much like tar, or any other very viscous substance, it can easily be seen that a high velocity in changing the shape is dangerous, while at a lower one it may be done with perfect safety. In Mr. Peck's presses the lift of the drop is regulated by altering the throw of the lifting crank. The lifter itself is entirely disconnected from the anvil and guides. The drop is lifted by a strap, and by this arrangement and the action of the crank the rebound of the drop is caught and the drop prevented from resting upon and so cooling the work. This is of great advantage in all kinds of forged work where a succession of rapid blows are needed before the work can cool off. In general it is found best to increase the weight of the hammer, reduce the lift and so get any desired number of blows per minute. The connection between the drop and the lifter being made by a flexible strap, the jar of the blow does not in any way injure the lifting machinery.

The Country's Commercial Marine.

The report of the Register of the Treasury for the fiscal year ending June 30, 1878, shows that the total tonnage of the country has decreased during the year 29,835 tons, the registered tonnage having increased 17,854 tons, the licensed tonnage (under 20 tons) 817 tons, while the enrolled tonnage has decreased 48,506 tons. The actual decrease is believed to be about 29,660 tons, this amount being the excess of the losses over the gains during the year. The aggregate has been reduced by vessels laid up and not redocumented, rebuilt, read-measured, used for inland trade and other purposes, and sold to the United States government. The total tonnage reported for 1878 is 25,264 vessels of all classes, measuring 4,212,764 tons, against 25,386 vessels, measuring 4,242,000 tons in 1877. The canal-boat tonnage has increased 7296 tons, and the barge tonnage 25,456 tons, while the sailing tonnage has decreased 59,070 tons, and the steam tonnage 3518 tons. The proportion of the sailing tonnage registered is 58 per cent., and the steam tonnage 15 per cent.

The tonnage for the year is thus classified:

	Vessels.	Tons.
Sailing vessels	17,523	2,521,319
Steam vessels	4,472	1,167,678
Canal boats	1,071	88,691
Barges	2,198	435,076
Total	25,264	4,212,764

During the year there were built, of all classes, 1258 vessels, having a tonnage of 235,504 tons, which exceeds the tonnage built in 1877 by 58,912 tons. The iron tonnage built during the year measured 26,960, which exceeds the iron tonnage built in any one year since 1868, except the year 1874, when it reached 33,097 tons. The following table exhibits the class, number and tonnage of vessels built during the last fiscal year:

	Vessels.	Tons.
Sailing vessels	532	106,067
Steam vessels	334	81,860
Canal boats	19	1,903
Barges	373	45,669
Total	1,258	235,504

The tonnage engaged in the fisheries during the year was as follows: Cod and mackerel fisheries, 2435 vessels, measuring 86,546 tons; whale fisheries, 182 vessels, measuring 39,700 tons. Compared with 1877 these figures show a decline of 4539 tons in the cod and mackerel fisheries and 893 tons in the whale fisheries.

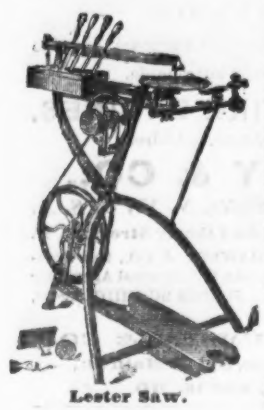
Commercial Decisions.—*Agencies.*—Parties in dealing with an assumed agent are bound to see and be assured that he is the agent that he represents himself to be, and that he is acting within the scope of his powers. If a father authorizes his son to act as his agent in respect to his notes on another, then to the extent of the authority conferred, the acts and statements of the son while performing the business of the agency will be binding. But authority in a son to keep a party's books and accounts, and to figure the interest due on notes, does not show authority in the son to collect and settle such notes and accounts.—Reynolds *vs.* Ferree, Sup. Ct. *Partnership.*—Under the dissolution of a firm a creditor received the individual notes of one of the partners for a firm debt. There being conflicting testimony as to whether these notes were taken in payment of the debt, or merely as collaterals, it was held that the amount of firm property turned over to the maker of the notes upon the dissolution of the firm, and his ability to pay the creditor's demand, were proper facts to be considered by the jury, in connection with other circumstances, in determining whether such agreement was made. In this decision the court declared that if these notes were made postponing the time of payment of the debt, without the assent of one partner, it was a question whether such partner should not be considered as merely a surety for the debt, and discharged from liability by the creditors' acceptance of his partner's individual notes.—Gates *vs.* Hughes, Sup. Ct., Wis.

The Third Form of Carbon.—Mr. J. Blodgett Britton, the well-known chemist of Philadelphia, contributes the following to the question of a third form of carbon in steel: The announcement is not new. Metallurgical chemists have been aware of the fact for some time. It was stated in *The Iron Age* nearly two years ago as having been known long previously, and by reference to the published proceedings of the American Philosophical Society, vol. xvii., No. 101, page 712, it will be seen that I exhibited the substance and illustrated its behavior with acids. It is a semi-graphitic (and so called) and not a semi-combined form, and if properly searched for will be found not an uncommon substance in some grades of Bessemer, Siemens-Martin, and other steels, and in pig and bar iron. In the determinations of carbon by the colorimetric method at times it is a source of material error. The question now is not as to a third form of carbon, but as to the existence of a fourth one (*i. e.*, a second one of the combined), and, if Mr. Debrunner and other competent metallurgical chemists will give to the subject careful investigation and publish the result of their labors, they will do much for metallurgical science.

New Strikes of Natural Gas near Pittsburgh.—The National Gas Co., which for the past two years has been supplying the large establishment at Etna, has struck a new well, which is reported to have increased the pressure to such an extent that there is a large surplus. This will probably induce Graff, Bennett & Co. to resume the use of gas for fuel. It will be remembered that the latter firm was supplied with gas when the pipes were laid, but when the supply decreased it was cut off. Now it is said the supply is ample for both mills. In the meantime the new gas well at Murraysville is creating as much excitement as ever. They have it so arranged that it burns from four 2-inch pipes, and the light burns so brightly that you can read a paper one mile from the well. It is claimed that 297,555 cubic feet escape every 12 hours.

Foot Power Bracket Saws

Are now so much in demand that some of them are being sold in almost every town in the United States. Many dealers are doing a profitable Christmas trade on such goods at a time of the year when other business is usually dull. The two Saws shown in these cuts are the ones most in demand. We advertise them as for sale at the hardware stores, and they will be called for. We make a fair discount to the trade.



Lester Saw.

LESTER SAW.

The New LESTER SAW is made of Iron, with all the working parts of Steel, and contains ALL KNOWN IMPROVEMENTS to this date. It is handsomely painted red and green with red stripes, and presents a beautiful appearance. Those parts which are not painted are either Polished or Japanned. We warrant the Saw to be just as herein stated, and we know it will give entire satisfaction, being a more expensive machine than those which we formerly sold for $25. 1st. It consists of a SCROLL SAW, with Tilting Table for Inlaid work; arms 18 inches in the clear; clamps which will hold saws of any length or width, and face them in four different directions, cutting lumber from 1-16th to 1 inch in thickness; speed, 1000 strokes per minute. 2d A CIRCULAR SAW 2¼ inches in diameter, which will cut lumber ¼ inch and less; with an Iron Table 4 by 5 inches. 3d. A DRILLING ATTACHMENT with six Stubs' Steel Drills of various sizes for wood or iron work. 4th. An EMERY WHEEL, with wide and narrow rim. 5th. A TURNING LATHE, with Iron Ways and Rest, Steel Centres and three Best Steel Turning Tools; length of Ways, 15 inches; distance between Centres, 9 inches; swing, 3 inches; length of Slide Rest, 4¼ inches; number of revolutions per minute, 7000. Also, with each Machine, six Saw Blades, a Wrench, Screw Driver, Extra Belt and two sheets of Designs, with a nice box for the small tools and a box for the whole machine. It is taken apart when shipped and packed in a box, but the working parts are all left in place and the frame is put together again by a single bolt.

Price for everything above named, - - - - - $8.00

The same without the Lathe and Circular Saw, - - $6.00

When desired, we furnish with the Lathe a very nice Drill Chuck for working metals and a Tail Stock, with Screw Centre, for $2.00 extra.

Rogers Saw.

ROGERS SAW.

Scroll Sawing and Drilling Attachment. Iron Table, adjustable for Inlaying.

All the working parts of iron and steel; weight, with box, 30 pounds; hight of table above the floor, 32 inches; 12-inch belt wheel; 5-inch balance wheel; arms 18 inches in the clear; latest improved clamps; round belts; extra drills and wrench. The iron and steel parts are polished or Japanned; the wood is painted dark. It is not as good as our Lester Saw, but is much better than any other cheap machine in the market.

Price, including all the attachments and the box, - - $3.00

MILLERS FALLS CO., 74 Chambers St., New York.

Established in 1839. Formerly L. & A. G. Coes.

L. COES & CO.

Manufacturers of L. Coes'

GENUINE IMPROVED AND MECHANICS

Wide Bar Full Length. Wide Bar Full Length.

Patent Screw Wrenches

UNDER PATENTS DATED

JUNE 26, 1866, MARCH 23, 1869, REISSUED 1870.

NOVEMBER 10, 1863, FEBRUARY 23, 1864, REISSUED JUNE 1, 1869, IMPROVED AUG. 1, 1877.

The back thrust when in use borne by the SHANK instead of the Handle.

None genuine unless stamped "L. COES & CO."

WORCESTER, MASS.

Warehouse, 97 Chambers St., & 81 Reade St., N. Y

HORACE DURRIE & CO., Sole Agents.

Established in 1854.

STEPHENS & CO.,

Manufacturers of **U. S. Standard BOXWOOD and IVORY RULES.**

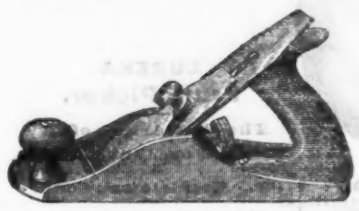
Also Exclusive Manufacturers of L. C. STEPHENS' PATENT COMBINATION RULE.

Rules graduated in foreign measure to order. RIVERTON, CONN.

H. DURRIE & CO., New York Agents, who will supply the trade at factory prices.

BAILEY WRINGING MACHINE CO.,

No. 99 Chambers Street, New York.



MANUFACTURERS OF

Novelty and Excelsior Clothes Wringers,
Defiance Metallic Planes,
Spoke Shaves, Try Squares, etc.,
Novelty Carpet Sweepers.

MANUFACTURERS' AGENTS FOR

American Meat and Vegetable Choppers,
Silver's Stuffers and Presses,
Simpson's Quick-Adjusting Parallel Vises,
Novelty and Relief Washing Machines,
Domestic Ironing Mangles.

SPECIAL QUOTATIONS ON THE ABOVE GOODS FOR EXPORT.

Send for Illustrated Price List and Discount Sheet.

ESTABLISHED 1850.

WM. HASSALL,

Manufacturer of

American and French

Wire Nails

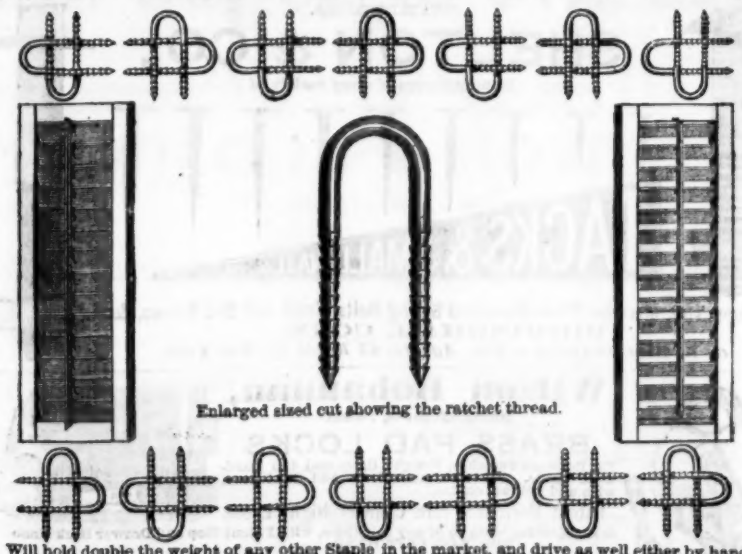
With Flat, Round, Oval, Depressed, Screw Fancy Heads, etc.

Brass Hooks for Jewelers' Cases, Zinc and Iron Hinges, Turn Buttons, Thumb Springs, Book Clasps, and Fancy Metal Work of all kinds.

OFFICE AND WORKS: *Nos. 63 & 65 Elizabeth Street, New York.*

Patent Improved Cone Pointed, Ratchet Thread,

Steel Wire BLIND STAPLES.



Enlarged sized cut showing the ratchet thread.

Will hold double the weight of any other Staple in the market, and drive as well either by hand or machine, and not split the wood.

J. LLOYD HAIGH,

Sole Manufacturer - - 81 John Street, New York.

NATIONAL Horse Nail Co.

MANUFACTURERS OF

FINISHED

[BRIGHT OR BLUED]

These nails are made of the best brands of **NORWAY IRON,** and are guaranteed to be equal to any in the market.

NATIONAL HORSE NAIL CO.,

VERGENNES, VT.

HORACE DURRIE & CO., Agents,
No. 97 Chambers St., New York

PUTNAM'S HOT FORGED & HAMMER POINTED Horse Shoe Nails.

TRADE MARK.

Made from the best of Norway Iron.

The only *hot forged* machine made Horse Shoe Nail in the world that is *not sheared or cut* on the point. Warranted *never* to *split* or *silver* in the driving, and to hold the shoe *longer* than any other Nail. For sale by the hardware and iron trade generally.

PUTNAM NAIL CO.,

P. O. Address, Nepenset, Mass. **BOSTON.**

ANVIL NAIL CO.

We desire to call the attention of the trade to our new manufacture of

Steel Horse Shoe Nails,

made from metal prepared in the Martin-Siemens Furnace by our PATENT process, which produces a nail having all the requisites for a

PERFECT HORSE SHOE NAIL.

The well-known desirable properties of a perfect nail are, that the POINT should be sharp, the SHANK stiff, to drive without crippling under the hammer, SOFT enough to clinch readily, while sufficiently tough to avoid all danger from the "drawing the clinch" or breaking the neck under the head. These properties we claim for the

"ANVIL HORSE NAILS."

In the process of manufacture the metal is compressed under the head, which gives the nail great strength where it is required (between the shoe and hoof), and the cold rolling gives it a stiffness attained in no other way, while the quality of the metal used insures a clinch and point unsurpassed by any nail ever offered in the market.

Samples and prices sent on application.

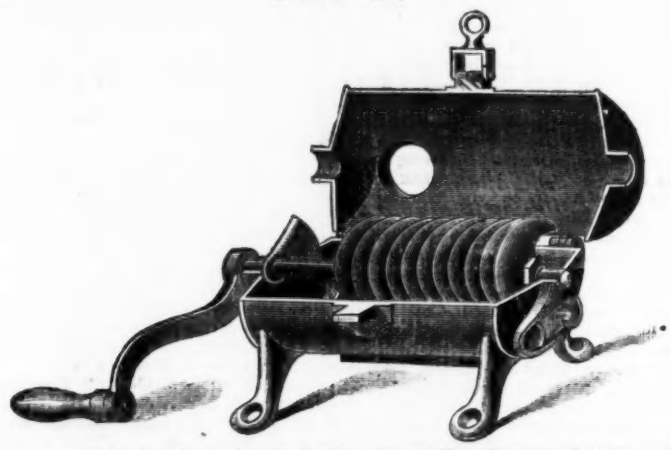
ANVIL NAIL CO.,

65, 67 and 69 Washington St., New York.

These Axes Made from HORACE DURRIE & CO. Agents, - - New York. Firth's Best English Cast Steel.

PENNSYLVANIA MEAT CUTTER.

1878.



After many careful tests and experiments, the PENNSYLVANIA MEAT CUTTER is placed upon the market with the fullest confidence of its superiority. It cuts the meat rapidly and is easily adjusted to cut coarse or fine. The knives are the best quality cast steel, tempered and hardened, easily removed from the shaft for the purpose of grinding, or can be sharpened if necessary by the use of a flat file, without being taken from the shaft. The comb (below the shaft and cutters) is malleable iron. Through this comb the knives pass and the meat entirely cut. At the price these are placed upon the market they can reach the consumer at a price that must guarantee popularity.

PRICE LIST.

No. 1, containing 8 Steel Knives		Per dozen,	$24.00
No. 2, " 11 "		"	28.00
No. 3, " 22 "		"	36.00

Nos. 1 and 2 are packed 1-2 dozen in a box; No. 3 p[illegible]en in box.

Discount to the trade, 50 per cent. Orders solicited.

LLOYD, SUPPLEE & WALTON,

No. 625 Market Street, PHILADELPHIA.

THE "NEW" CROWN

Christmas Tree Holder

is offered to the public as a decided improvement upon last year's style, in the hope of meeting with a largely increased demand during the present season.

The usefulness of this article is obvious to anyone who has tried to arrange blocks, boxes or other appliances for holding Christmas Trees.

This Holder is so constructed that it will firmly clamp and hold any size tree under three inches diameter. The legs are placed in the sockets and fastened by the small thumb screws; the ring nut is turned downward, whereby the clamps are thrown outward. The tree is then set in the holder, and the ring nut turned upwards until the clamps have a sufficiently tight hold. If desirable, the holder can be fastened to the floor, &c., by means of small tacks and screws. Should the tree shrink and become loose in the holder, a slight turn upwards of the ring nut will tighten it again.

Price, $9.00 per dozen.

MANUFACTURED ONLY BY

THE AMERICAN MACHINE COMPANY,

Office and Factory, 1916 to 1924 N. 4th Street, Philadelphia.

INDUSTRIAL ITEMS.

MASSACHUSETTS.

The bankrupt estate of Hayden, Gere & Co., of Williamsburg, has paid a 25 per cent. dividend and will probably pay 10 per cent. more before a great while. The Gov. Hayden estate has received $34,000 from the present dividend.

The Washburn & Moen Company of Worcester are to have a new 900-horse-power engine from the Corliss Company of Providence.

CONNECTICUT.

The brick factory of the Novelty Works, in Wethersfield, was burned on Monday morning the 25th ult. It was occupied by the Hopson & Brainard Manufacturing Company. The building cost $75,000 and was insured for $21,000. The loss is estimated at $35,000.

NEW YORK.

The New York Central Railroad Company are introducing into their cars what is known as the Hitchcock patent lard-oil lamp, manufactured in Watertown. The light of one of these lamps is said to be equal to eight of the candle-burners now in use.

The Saranac Horse-Nail Company, formerly of Vergennes, Vt., have opened their new works at Plattsburgh, this State. The factory is a one-story brick building, 150 by 50 feet, contains 10 machines and will furnish employment to about 50 men.

One of the largest iron castings ever made in the vicinity of Troy was turned out by Neemes & Sons last week. It was a trip hammer for the Rensselaer Iron Works, and contained between 10 and 12 tons of iron.

NEW JERSEY.

The Hackettstown Iron Works, which R. D. Wood & Co., of Philadelphia, purchased at sheriff's sale for $17,000, cost $170,000 to construct only a few years ago.

PENNSYLVANIA.

The Baldwin Locomotive Works are still actively at work with upward of 1600 men on full time. Business prospects are quite encouraging, both as regards the home and foreign trade. They have just entered an order from Nicaragua, and one for several large locomotives for Norway, the first order of the kind we believe that has ever been received in this country from either Sweden or Norway.

The bridge-building firm of Clarke, Reeves & Co., at Phœnixville, Pa., has just taken a contract for the construction and erection of one solid section of four miles of the Metropolitan Elevated Railway in New York city, besides some scattered sections, which will bring the whole contract up to about five miles of railway. This contract will cause the Phœnix Iron Works to be run to their full capacity during the whole winter. About 12,000 tons of iron will be required.

Charles L. Bailey & Co., Chesapeake Nail Works, Harrisburg, are running full time, and have difficulty in keeping up with their orders. The Central Iron Works, branch of the same company, have been turning out 140 tons a week of boiler plate, tank and bridge iron; they have stopped a short time to put in some new shearing machinery, engines, &c., but resume on the 5th with their rolls refitted. These are 8 feet long, 31 inches diameter and three-high.

The Seamless Steel Ware and Frog Co. of Harrisburg, are full of orders on their various specialties. They manufacture for the Tousey & Buchanan Interlocking Switch Co. their Improved Point and Signal Locking Apparatus, by which the switch operator at his station cannot break the track or shift the switch improperly without first displaying the danger signal and giving warning to approaching trains. Since commencing last spring they have put up six such stations—one on the Baltimore and Potomac Railroad, at the junction of the Western Maryland; another at the Northern Central Junction; one at East Liberty Yard, Pittsburgh, just finished; another just finished at Communipaw for the Jersey Central; one for the Metropolitan Railway, and still another for the New York Elevated Railway. They have also applied the principle to five drawbridges on the New York and Long Branch Railroad. In this way one man can control all the switches in a yard, and if he neglects his duty the tell-tale signal gives timely warning.

The Billmeyer & Small Co., car-builders at York, have just finished a number of narrow-gauge cars for a Brazilian road and expect further foreign orders. They report almost daily inquiries.

The Thomas Iron Company at Hokendauqua blew in one furnace some three weeks ago to take the place of one which they were obliged to blow out for repairs. The company have at present two furnaces in blast at Hokendauqua and two at Lock Ridge. Between the Lock Ridge and Thomas Furnaces, owned by the one company, a telephone wire has been placed. The distance is 12 miles. The company have also completed a laboratory at the Lock Ridge Furnace, modeled after the large laboratory at Lafayette College, Easton. Mr. Potter Shimes, of Easton, has been appointed chief chemist.

Our Hamburg correspondent writes that negotiations are being made for leasing the West Hamburg Iron Works, owned by the Reading Railroad Company, and resume operations at an early date. The matter has assumed an active form, and, if the inducements warrant it, a revival and reaction in our marts must be near at hand. If leased, only the part of the large establishment devoted in the past to manufacturing merchant bar iron will be operated.—*Reading Times.*

The Glendower Iron Works at Danville have been running to their full capacity for the last four months, eight heating furnaces and eight puddling furnaces. They have as much as they can do for the balance of the year, making rails for the Shenandoah Valley Railroad and the Pittsburgh, New Castle and Lake Erie Railroad. They have also on hand a large amount of work for the plantation trade. They are now doing extra night work on rails.

The Pennsylvania Diamond Drill Company at Pottsville received an order last week from the government of Victoria for a diamond drill, to be used in prospecting for gold in the province of Victoria. This is the second order received from that government.

We take the following from the Sharon *Herald* of the 29th ult.: On Tuesday night, the 19th ult., the fires of the Kimberly Mill were lighted in all the furnaces in the puddle mill, but there seems to be a wrong impression out about everything connected with the works. On Saturday, the 23d ult., all sums below $50 owed prior to, and all money earned by everybody connected with the works since the 24th of August last, was paid in full up to and including Thursday, the 14th inst. It is generally understood that the remainder of the money owed to the men will be paid by the court some time during the next two weeks. A rumor was put in circulation to the effect that all the old hands had been discharged, but there is no truth whatever in it. Keel Ridge Furnace was finished on Thursday, and all that is now required is the necessary drying out, which will be done by the time the water pipes are all rearranged and connected. At the Stewart Iron Works, furnace No. 1 averaging up to 50 tons a day No. 1 Bessemer, none of which is accumulating on the yard. Douglas Furnace No. 2 is working up to the average, generally No. 1 foundry. Repairs are going on slowly on No. 1. Spearman No. 2 doing as well as is required, making principally red-short mill and a good bit of it. Fanny Furnace is working up to and over 40 tons a day.

The Erie Car Works run night and day.

The machine shop, casting house and stock house of the Oliphant Furnace, which were burned a few days ago, will be promptly rebuilt, and it is thought will be ready to work again by Christmas.

PITTSBURGH AND VICINITY.

The fly-wheel at Miller, Metcalfe & Parkin's mill, at the foot of Forty-ninth street, Pittsburgh, burst about 11 o'clock Monday night, the 25th ult. The fragments went through the roof and wrecked the building considerably, but strange to say no one was hurt, although quite a number of employees were at work in the vicinity.

The steel manufacturing firm of Anderson & Passavant was dissolved on the 20th inst., Mr. Anderson purchasing Mr. Passavant's interest. The business will be continued under the firm name of Anderson & Co.

The bolt factory recently erected by the Pittsburgh Forge and Iron Co. in Allegheny City has not yet started operations.

The entire department of Messrs. Lewis, Oliver & Phillips' lower mills in Allegheny City are on double turn.

OHIO.

The Huber Mfg. Co., Marion, organized one year ago, have a capital of $75,000. Last season they manufactured 2000 Huber's patent scrapers and 30 portable engines. Six thousand hay rakes have also been made and sold by this company during the year.

Baird Furnace, Gore, is out of blast, but is expected to blow in about the middle of December.

Belfont Furnace, at Ironton, blew in on Monday, the 25th ult.

Ohio Furnace, at Hanging Rock, has blown out to put in a new hearth.

Both sheet mills and the plate mill at Newburgh are running fulltime.

It is said the Enterprise Fire-clay Co. (terra cotta), at Leetona, have been compelled to return orders to the amount of several thousand dollars unfulfilled.

On Tuesday, the 26th ult., the Himrod Furnace turned out 50 tons of No. 1 foundry and 32 tons 5 cwt. of No. 2 foundry iron, making in all 82 tons 5 cwt.

Brown, Bonnell & Co., of Youngstown, recently made a good portion of their pay in gold notes of the First National Bank of Stockton, California.

ILLINOIS.

The Missouri Car and Foundry Company, whose works were burned at East St. Louis, have been offered a liberal bonus by property holders to rebuild and locate in the southern part of St. Louis, near the track of the Iron Mountain Railway and in the vicinity of the furnaces and steel works.

KENTUCKY.

Pennsylvania Furnace, at Riverton, will blow out on Saturday, the 7th inst. It will remain idle next year.

INDIANA.

The brass foundry and machine works at Fort Wayne, are being enlarged by a new foundry, which will bring the capacity of the works up to 365 car wheels per day.

MICHIGAN.

The *Iron Port* of Escanaba says it is rumored that a new blast furnace is to be built on the site of the old one.

NOTICE

TO THE

Hardware Trade

in all Parts of the

WORLD.

You are hereby NOTIFIED that from this date on, December 2d, 1878, the

Patent "Eclipse" Fan Blower,

Tire Benders,

Centennial Jump Seat Irons,

AND THE

Scandinavian Jail Pad Locks

will be offered at a BARGAIN and all goods GUARANTEED.

AGENCIES SOLICITED at home and abroad on easy terms.

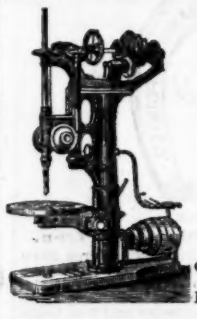
Address the Manufacturer,

EZRA F. LANDIS,

Lancaster, Penn..

U. S. A.

UPRIGHT DRILLS.



NEW PATTERNS,
Geared Head.
Three-change Geared FEED
for
HAND AND POWER.
Quick return to spindle.
A Slendid Tool,
CHEAP.
Send for Circular.
EDWIN HARRINGTON & SON,
Manufacturers of
MACHINISTS' TOOLS,
Cor. of North Fifteenth St. and Pennsylvania Ave.,
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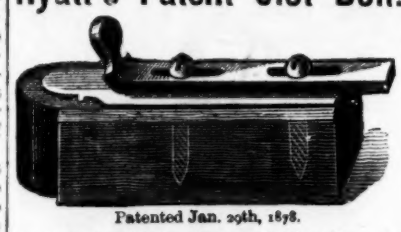

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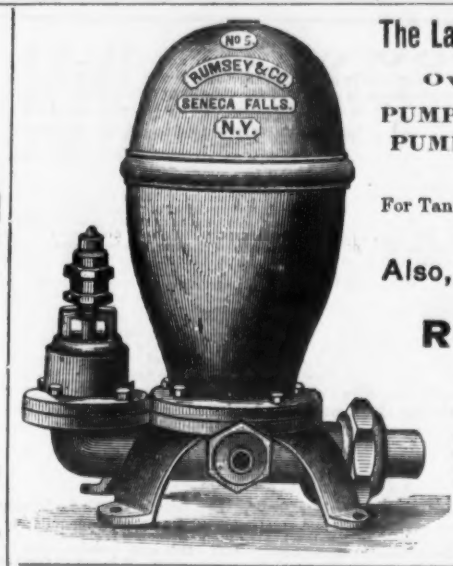

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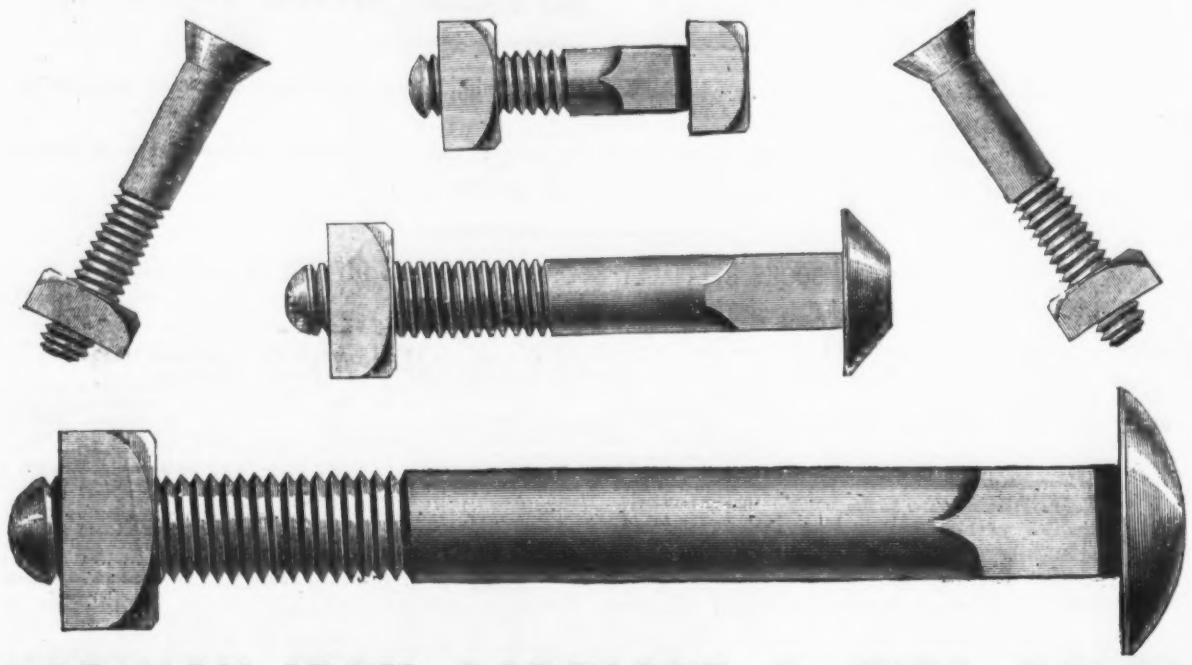

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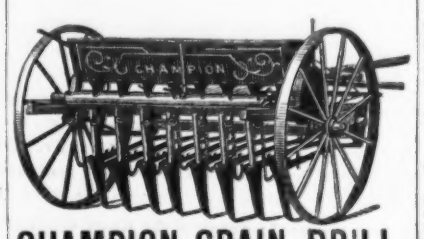

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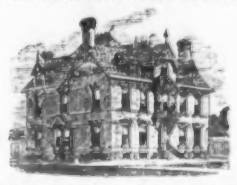

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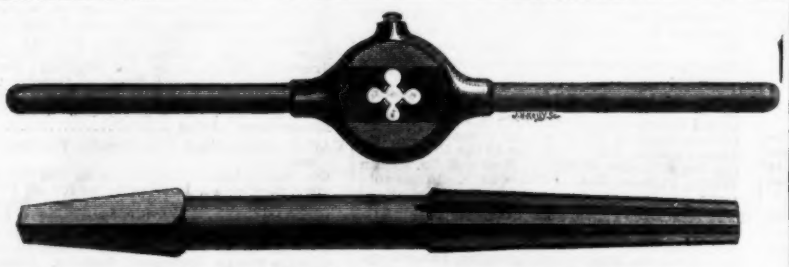

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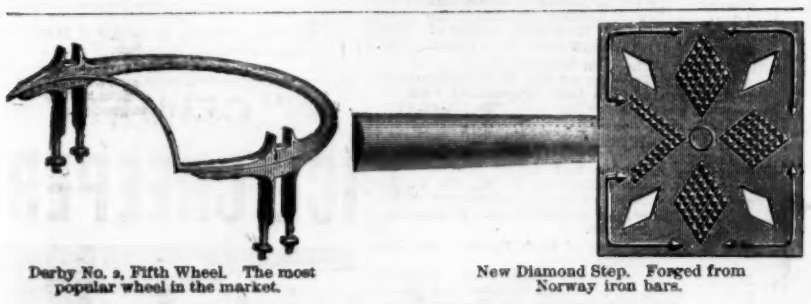

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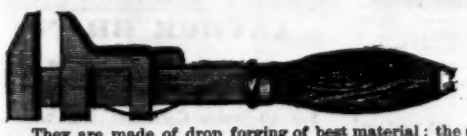

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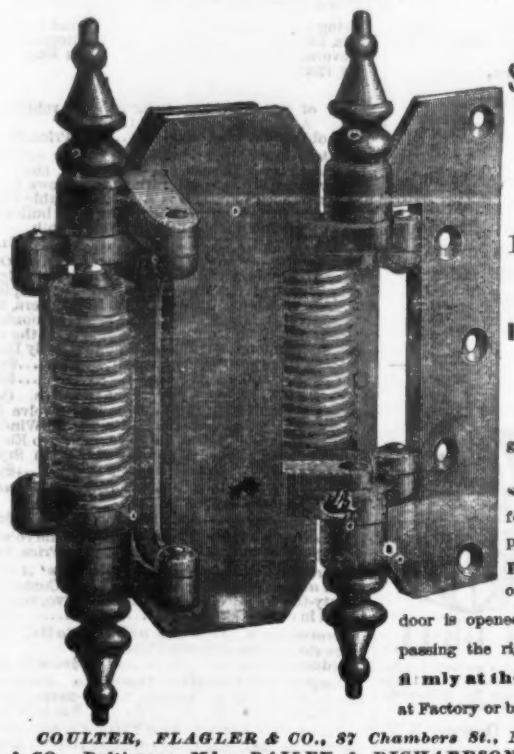

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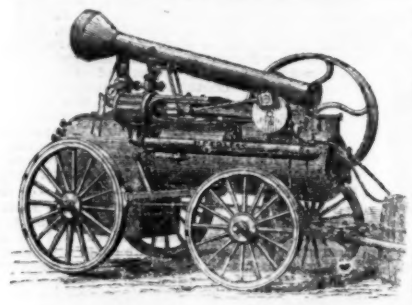

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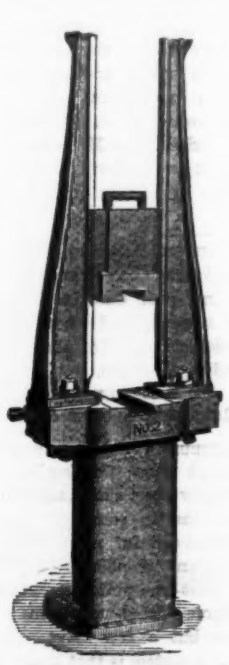

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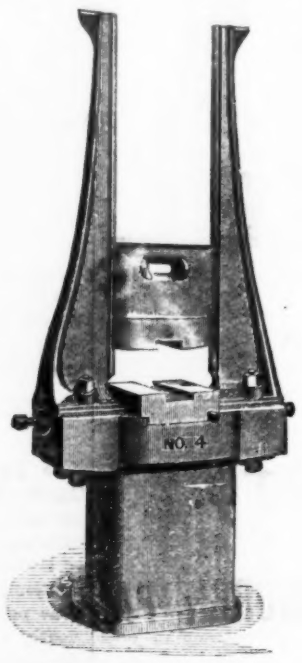

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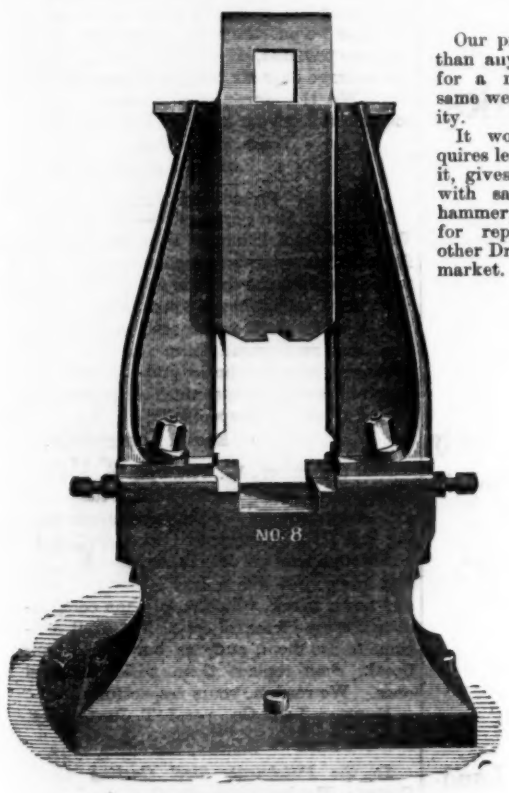

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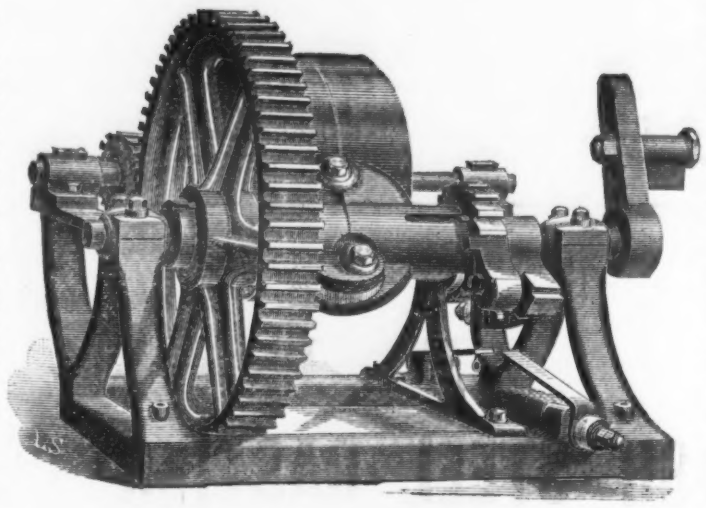

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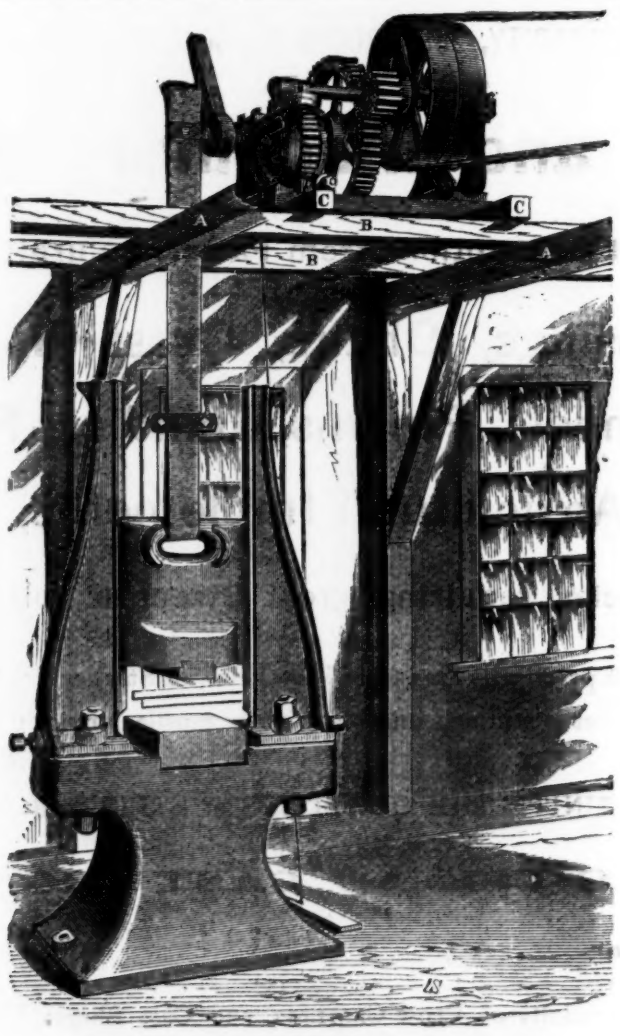

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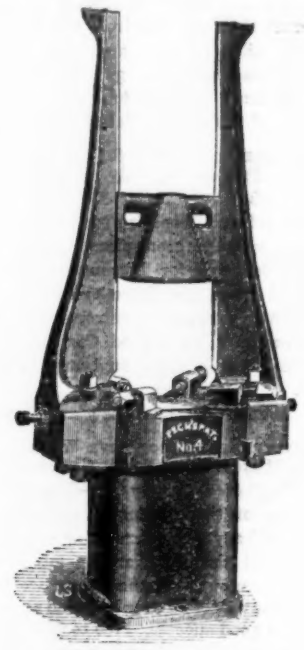

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MANCHESTER LOCOMOTIVE WORKS,
MANCHESTER, N. H., Nov. 13.

Pittsburgh Steel Casting Co.—GENTLEMEN: Your letter of the 11th inst. is at hand. In reply, would say that we are using your Castings now all the time, and in many cases welding them out. We find them weld out as well as any steel we ever had, and are using them with good success. We took a casting of a loop sent by you and made a turning tool of it for the lathe, and the tool made proved first rate; was as good as any tool used, and did good service as a turning tool for some time. We are well satisfied with your Steel Castings for all purposes for which we use them. Yours, truly,
A. BLOOD, Agent, per COOPER.

[We have made for the A. V. R. R. 37 Spark Cones since 1874, all of which are in use at present, and some of them have run over 28,000 miles in engines doing the heaviest work on the road.]

PITTSBURGH, April 24.

Pittsburgh Steel Casting Co.—GENTLEMEN: Having for some time back been using your Cast Steel Dies in our Steam Hammers, we have much pleasure in stating that we consider them far superior to any other manufactured, either from Cast Iron or Wrought Iron with Steel faces. Yours, respectfully,
WILSON, LEGGATE & Co.
JAMES H. SIMPSON, Foreman.

PITTSBURGH, PA., March 17, 1873.

Pittsburgh Steel Casting Co.—GENTS: We have used your Castings in some of our machinery, and have found them to give good satisfaction in all cases. Very respectfully,
KEYSTONE BRIDGE CO.
J. L. PIPER, General Manager.

PITTSBURGH, March 6, 1873.

Pittsburgh Steel Casting Co.: The Crusher Jaws which we have been using of your make have given good satisfaction. We consider them a good improvement.
BYERS, MCCULLOUGH & Co.

ERIE, PA., March 3, 1873.

Pittsburgh Steel Casting Co., Pittsburgh, Pa.—GENTLEMEN: During the past year we have used a large quantity of your Steel Castings. We would say in regard to their qualities that thus far they have given the utmost satisfaction. Very truly yours,
STEARNS, HILL & Co.,
J. W. PARISH, Sup't.

PENNSYLVANIA IRON WORKS,
EVERSON, MACRUM & Co.,
PITTSBURGH, PA., Oct. 15, 1875.

Pittsburgh Steel Casting Co., Pittsburgh, Pa.—GENTLEMEN: We have had in constant use a set of pinions made by your process over three years and they have given us perfect satisfaction. We consider them the best pinions we ever had and equal to 25 cast-iron sets. These pinions are still in use.
Very respectfully,
EVERSON, MACRUM & Co.

CORLISS STEAM ENGINE CO.,
PROVIDENCE, R. I., APRIL 17.

Pittsburgh Steel Casting Co.—GENTS: In reply to your inquiry about the Steel Miter Gears, 43 inch diameter, 12 inch face, cast for us of steel, by your process, I have to say they have been running for several months at about 200 revolutions per minute, and judging from the working of the material I believe they cannot be broken by any force that can be transmitted to them through the 6-inch shaft to which they are attached, which could not be said of cast iron in the same place, as they frequently broke. They drive at times for weeks together more than 300 horse-power, and are believed to be a complete success. Yours,
EDWIN REYNOLDS,
Supt. Corliss Steam Engine Co.

PITTSBURGH, PA., March 17, 1873.

The Pittsburgh Steel Casting Co.—GENTLEMEN: We have been using your Steel Castings with the very best satisfaction for the past year, and we take the greatest pleasure in recommending them to others, as we regard Steel Castings as being a valuable auxiliary in the manufacture of machinery.
Yours very respectfully,
PORTER, BELL & Co.

PITTSBURGH, PA., March 6, 1873.

Pittsburgh Cast Steel Co.—GENTS: We find your articles of cast steel very well adapted to various portions of engine work, taking a fine finish and saving labor.
Respectfully yours,
ROBINSON, REA & Co. J. F. W.

JAMES IRWIN, President. HENRY W. PATTERSON, Gen. Man. and Treas. WM. HAINSWORTH, Supt.

THE

PITTSBURGH STEEL CASTING COMPANY,

(ESTABLISHED IN 1871.)

MANUFACTURERS OF

IMPROVED STEEL CASTINGS

UNDER HAINSWORTH'S PATENTS.

WORKS, Twenty-sixth and Railroad Streets, - PITTSBURGH, PA.

MELTING CAPACITY, 288 CRUCIBLES, 80 LBS. EACH, PER DAY.

Railroad and Machinery Castings

Of all Descriptions from Patterns Furnished.

Frogs, Crossings, Chairs, Cross-Heads, Links, Dies, Wheels, Pinions, Spindles, Parts of Agricultural Implements,

And all Articles requiring great Strength and Durability.

We make Castings practically free from blow-holes, of Steel which is as soft and as easily worked as wrought iron, yet is stiff and durable, with a tensile strength of not less than 65,000 pounds to square inch.

In short, our castings UNITE THE QUALITIES of STEEL and WROUGHT IRON.

WE USE NO CAST IRON.

Send for Circular.

☞ We make a specialty of PLOW CASTINGS, and Cast Shares, Mold-boards and Landsides to patterns sent us.

We make these Plow Castings of very strong and durable Steel, which can be drawn out, worked and welded by any blacksmith.

We especially recommend our Plow Steel for its great durability. We have been making Plow Castings for seven years, and the rapid and steady growth of our business is the best evidence of the excellence of our Steel. We have made over 220,000 Points, Moldboards and Landsides for Plows.

Shrinkage allowance in patterns for Steel Castings is one-quarter of an inch to the foot.

[We have made to order over 15,000 spu and bevel wheels, diameters from 4 inches to 6 feet, weighing from 4 to 2700 lbs. each.]

PACIFIC MILLS, LAWRENCE, MASS.,
June 5, 1878.

To Whom it may Concern: We obtained a pair of Steel Bevel Gears of the Pittsburgh Steel Casting Co., sizes, viz., 4 feet 6 inches and 4 feet diameter, 4 inches pitch, 10 inches face. We set them at work March 20, 1877. Their average work is 450-horse power. They show no signs of extra wear or strain. Cast-iron gears, from the same patterns, doing the same work, usually wear out or break in about one year. We are also running a smaller pair of Bevel Gears from the same foundry, diameter 3 feet 6 inches and 2 feet 6 inches, 2¾ inches pitch, 7 inches face, doing the work of 125-horse power. These commenced work about June 1, 1877, and to all appearances are doing well. Cast-iron gears from the same patterns averaged about three months and broke in every instance. JOHN FALLON, A. Agent.

CLEVELAND, OHIO, Jan. 24, 1873.

Pittsburgh Steel Casting Co.—GENTS: The Steel Miter Wheels that you sent us several months since for the Universal Mill are working well. We used them in place of cast-iron wheels that we had to replace about every two weeks. I should never think of using iron again for wheels in a place where there is an unusual strain on them. Respectfully yours, J. W. BRITTON,
Secretary and General Manager
American Sheet and Boiler Plate Co.

The above wheels have been in use over four years.

PITTSBURGH, March 17, 1873.

Pittsburgh Steel Casting Co.—GENTLEMEN: We have been using your Cast-Steel Spur Wheels for over a year, and they have given us much satisfaction. We take pleasure in recommending their use.
Yours, truly,
CARNEGIE, KLOMAN & Co.

PITTSBURGH, Feb. 14, 1873.

To the Pittsburgh Steel Casting Co.—GENTS: We have now Steel Pinions cast by you on most of our shears, some of which have been in constant use for more than a year without giving any trouble or any indication of any. Cast-iron pinions from the same pattern seldom lasted more than a month, and often but a few days. One great advantage of the steel is that it can be keyed and "shrunk" on so tight that it precludes the possibility of coming loose.
A. W. FOSTER, JR.,
M. M. for Singer, Nimick & Co.

Office of BAILEY, FARRELL & Co.,
Lead and Brass Manufacturers,
PITTSBURGH, July 22, 1878.

Pittsburgh Steel Casting Co., City.—SIRS: The set of Steel Bevel Gears you made for us three years ago for our mill are yet in good condition, and have given us no trouble since we put them in. Cast-iron gears off same patterns, doing same work, would not average over six months without breaking. We therefore have no hesitancy in recommending your steel for similar work.
Yours, respectfully,
BAILEY, FARRELL & Co

PITTSBUBGH, Jan. 22, 1873.

Pittsburgh Steel Casting Co.—GENTLEMEN: The Cast-Steel Hammer Dies we have had from you have proven very satisfactory, and we can recommend them to any person using Hammer Dies, as they are much tougher and will stand longer than the cast-iron die. We can also recommend them for machinery castings where toughness and strength are required, as they come much cheaper than forged work. Respectfully,
KLEIN, LOGAN & Co.

WHEELING, W. VA., Jan. 31, 1873.

Pittsburgh Steel Casting Co., Pittsburgh, Pa.—GENTLEMEN: We take pleasure in saying that after giving your Cast-Steel Levers a thorough trial on our Tack Machines, we find them just the thing. They run well and never break, which more than compensates for the increased cost. We shall continue to use them, and, as our iron levers break, shall replace them with cast-steel ones. We remain, yours respectfully,
NORWAY TACK Co., per J. T. JONES, Agt.

BOSTON, March 27, 1873.

To the Pittsburgh Steel Casting Co.—GENTS: Having used your Cast-Steel Castings for the Pulleys on my Pressure Blowers for some months past, I am pleased to report them very satisfactory. While they are quite easily worked, they are very strong, and I believe will prove to be just what I have been looking for. I consider them much superior to iron pulleys. Very respectfully yours, B. F. STURTEVANT,
Patentee and Sole Manufacturer Sturtevant Pressure Blower.

PITTSBURGH, March 6, 1873.

Pittsburgh Steel Co.: The Cast-Steel Dies you furnished us of various patterns have proven very satisfactory, and we think they are a good thing.
LEWIS, OLIVER & PHILLIPS.

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Borden & Lovell, 70 and 71 West, N. Y. 4
Carmichael W. J., 130 and 132 Cedar, N. Y. 4
Cooney Daniel F., 88 Washington, N. Y. 4
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J. H. Jackson & Co., 206 and 208 Franklin, N. Y. 4
Judson B. F., 457 and 459 Water, N. Y. 4
Kane C., Pittsburgh, Pa. 4
Lundberg Gustaf, 38 Kilby, Boston, Mass. 4
Ogden & Wallace, 85, 87, 89 and 91 Elm, N. Y. 4
Pierson & Co., 24 Broadway, N. Y. 4
Pullmann J. Wesley, Philadelphia, P. 5
Quincy John W., 98 William, N. Y. 4
Richards D. W. & Co., 92 Mangin, N. Y. 20
Wallace Wm. H. & Co., Albany and Washington streets, N. Y. 4
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Whitney A. R., 98 Hudson, N. Y. 4

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Bradley, Reis & Co., 22 Cliff, N. Y. 5
Burden Iron Works, Troy, N. Y. 4
Houdlette & Ellis, Boston, Mass. 4
Kirkpatrick, Beale & Co., Pittsburgh Pa. 4
Leonard John, 450 and 452 West, N. Y. 4
North Chicago Rolling Mill Co., Chicago, Ill. 37
Oxford Iron Co., 81 Washington, N. Y. 4
Phœnix Iron Co., 410 Walnut, Philadelphia 5
Roane Iron Co., Chattanooga, Tenn. 6
Rome Merchant Iron Mills, Rome, N. Y. 4
Rowland James & Co., 920 N. Delaware, Phila. 5
Rowland Wm. & Harvey, Philadelphia. 44
Shoenberger & Co., Pittsburgh, Pa. 4
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Vulcan Iron and Nail Works, Chattanooga, Tenn. 6
U. S. Iron and Tin Plate Co., Pittsburgh, Pa. 5
Wason Car and Foundry Co., Chattanooga, Tenn. 6
Wood Alan & Co., 519 Arch Philadelphia. 5
Zug & Co., Pittsburgh, Pa. 4

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DuBrul N. & Co., Cincinnati, O. 3
Howard & Morse, 45 Fulton, N. Y. 2

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Lathes.
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Disston Henry & Sons, Philadelphia. .....

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D. K. Miller Lock Co., Philadelphia, Pa. 40
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Romer & Co., Newark, N. J. 8
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Niles Tool Works, Hamilton, O. 43
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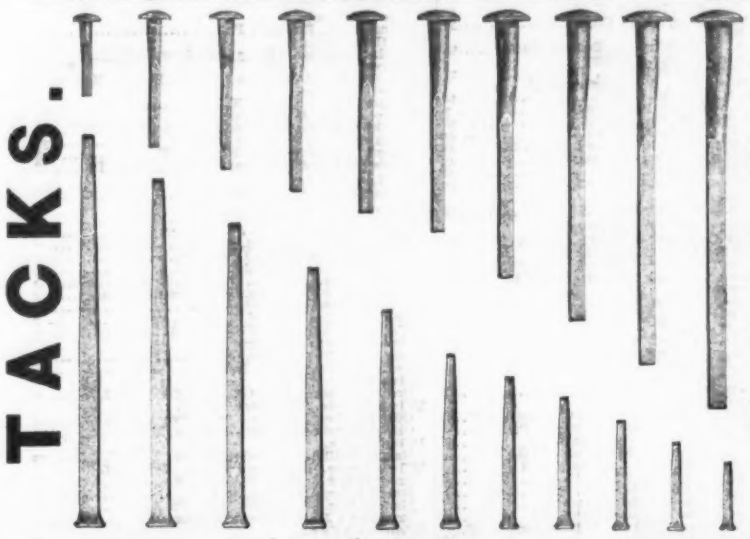

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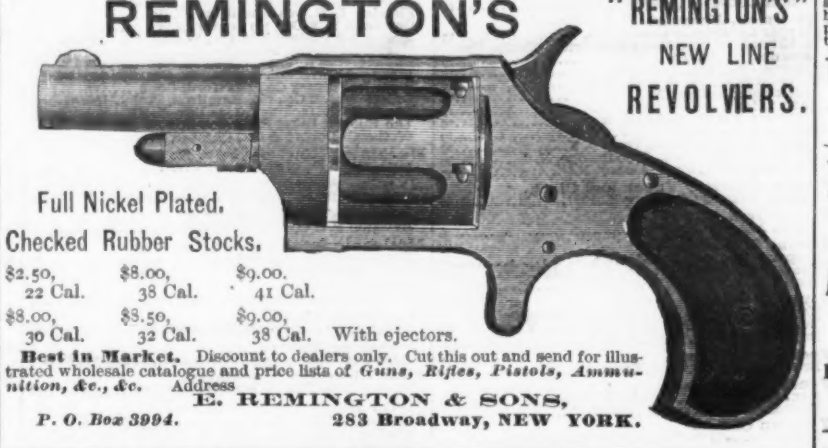

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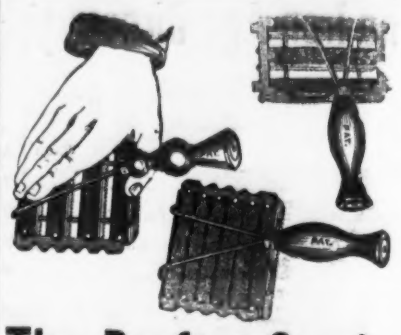

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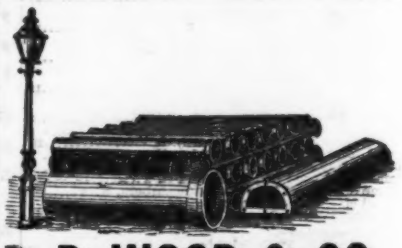

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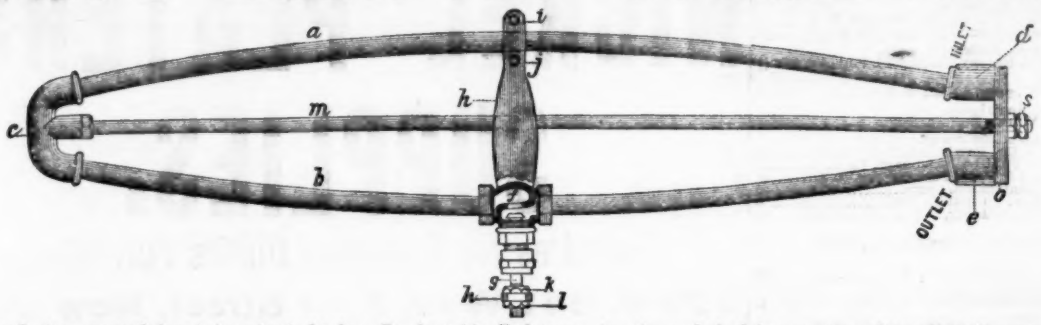

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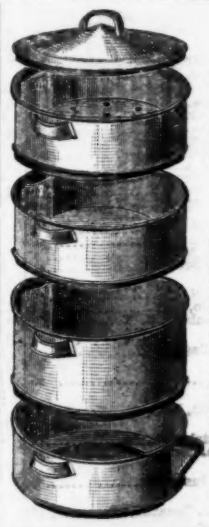

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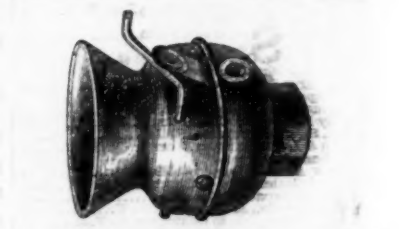

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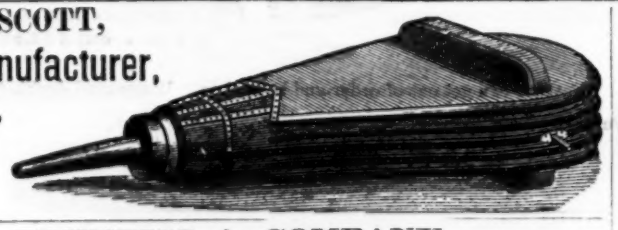

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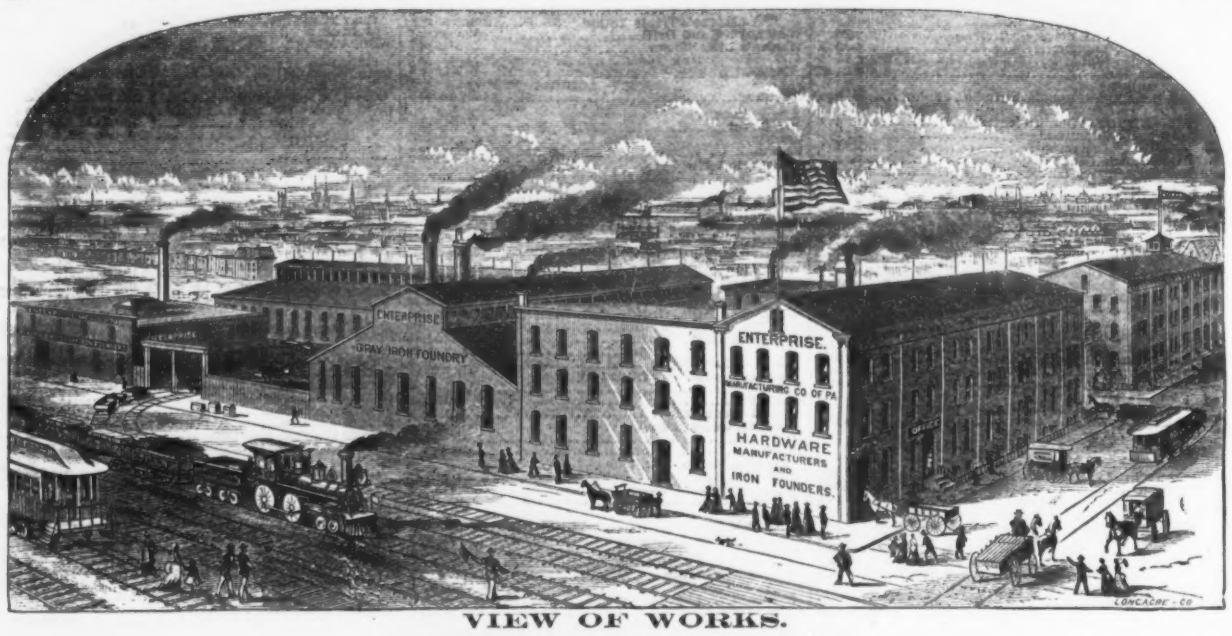

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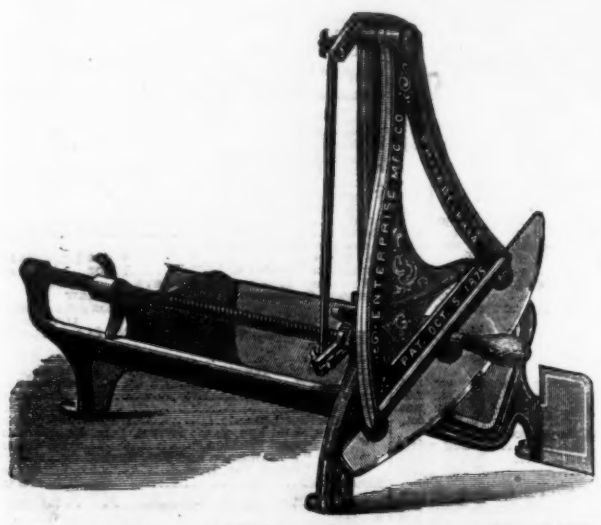

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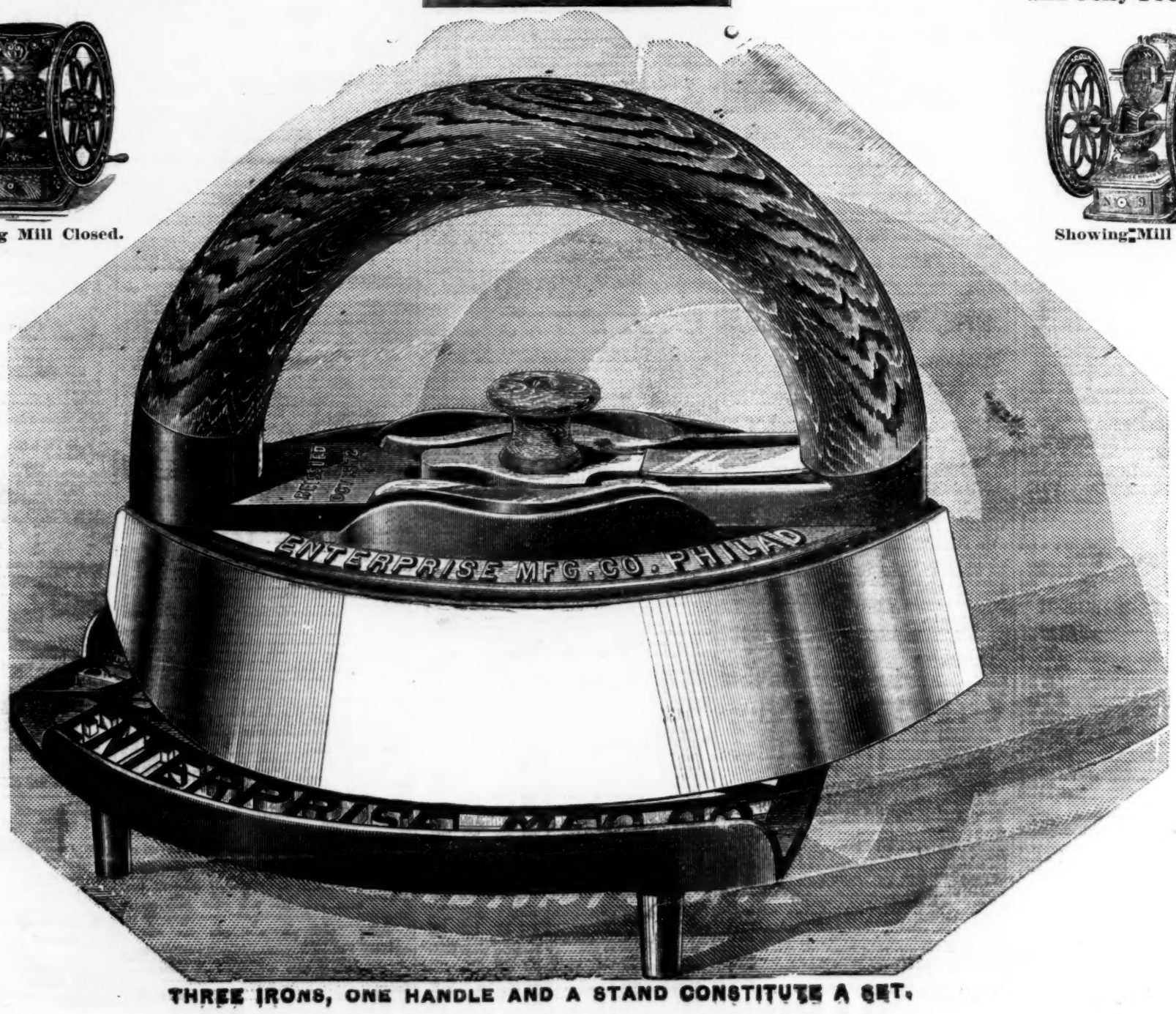

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Eagle Anvils (American) ₩ lb 9c dis 20 %

Apple Parers, &c.
Turn Table ₩ doz $6.75, dis 10 %
Lightning ₩ doz 6.75, dis 10 %
Bay State ₩ doz 13.00, dis 10 %
Reading, '72 ₩ doz $6.00, dis 10&2 %
" '74 ₩ doz 7.00, dis 10&2 %
" '75 ₩ doz 8.00, dis 10&2 %
" '76 ₩ doz 8.75, dis 10&2 %
Climax Corer and Slicer ₩ doz 6.75, dis 10 %

Augers and Bits.
Conn. Valley Mfg. Co.
Douglass Mf. Co.
Ives
Beecher (French, Swift & Co.)
Griswold
Nobles Mfg. Co.
Mason's Patent
} dis 50 @ 55 %
Cook's, Douglass Mfg. Co dis 50&5 %
Cook's, Ives dis 45&10 %
Snell Mfg. Co.'s C. S. Augers dis 50&10 %
" " B. Machine dis 50 %
" " C. S. Bits dis 40 %
" " Jenning's Bits dis 35 %
Jennings' Bits dis 10&10 %
Imitation Jenning's Bits dis 35 %
Ives' "Jennings" Bits dis 20&10 %
Lewis' Single Twist Bits dis 40 %
Andrews Bits dis 50 %
Griswold's Patent Bits dis 30 %
Expansive Bits, Clark's, small'$18; large, $2. dis 20 %
" " Ives $20 @ $30—dl 33⅓ %
" " Blake's $30—dis 40 %
" " Parmelee's $20 and $30. dis 33⅓ %
Hollow Augers Ives' } dis 40 %
" " French, Swift & Co.
" " Bonney's Adjust., ₩ doz $48—dis 25&10 %
" " Stearns' Adjust., ₩ doz $48—dis 25&10 %
" " Ives' Expansive each $4.50—dis 40 %
" " Univ'sal Expansive, each $4.50—dis 20 %
Gimlet Bits $7.50 ₩ gross, dis 40 %
" Diamond ₩ doz $1.00 dis 33⅓ %
" "Bee" dis 25&10 %
Double Cut Gimlet Fits Shepardson's dis 40 %
" " Ct. Valley Mfg. Co...dis 20&10 %
" " Hartwell's dis 50 %
" " Douglass' dis 40 %
" " Ives' dis 50&10 %
Morse's Bit Stock Drill, List of May 15, '76 dis 25 %
L'Hommedieu's Ship Augers dis 15 %
Watrous Ship Augers dis 15 %

Awl Hafts.
Sewing, Brass Ferrule $3.50 ₩ gross—dis 35&10 %
Peg, " 3.50 " dis 35&10 %
Patent Sewing, Short $1.00 ₩ doz—dis 35&10 %
" " Long $1.40 ₩ doz—dis 10 %
" Peg, Plain Top $10.00 ₩ gross—dis 35&10 %
" " Leather Top 12.00 " dis 35&10 %

Awls, Brad Sets, &c.
Awls Sewing, Common ₩ gross $1.35—dis 25 %
" Sewing, Best ₩ gross 1.40—dis 10 %
" Shouldered Peg ₩ gross 2.25—dis 15 %
" Patent Peg ₩ gross .65—dis 15 %
" Shouldered Brad ₩ gross $2.70—dis 25&10 %
" Handled Brad $8.00 ₩ gross—dis 25&10 %
" Handled Scratch $7.50 ₩ gross—dis 25&10 %
" Socket Scratch $1.00@$1.25 ₩ doz—net
Brad Sets, Aiken's ₩ doz $12.00—dis 40&10 %
No. 42, $10.50; No. 43, $12.50 dis 60 %
" Stanley's Excelsior. No. 1, $11.00—dis 25&10 %

Axles.
Common (Guy C. Hotchkiss, Field & Co.) ₩ lb 3½c
Solid Collar, Case Hardened, Chilled Box ₩ lb 8c
Axle Grease.—Frazer's ₩ lb 6c

Balances.
All Spring Balances. List July 25 dis 25&10 %

Bells.
Hand Light Brass dis. 75 %
" Extra Heavy dis 40&5&10 %
" White Metal dis 60&5&10 %
" Silver Chime dis 20&10 %
" Swiss dis 25 %
" Globe (Cone's Patent) dis 25&10 %
Gong, Abbe's dis 20&10 %
" Yankee dis 35&10 %
" Sarton's dis 40&2 %
Crank, Taylor's dis 25&10 %
" Brook's dis 50 %
" Cone's dis 10 %
" Connel's dis 50&10 %
Lever, Sargent's dis 60&10 %
" Taylor's Bronze or Plated Lever net
" " Japanned Lever dis 25&10 %
" Hart, Bliven & Mead Mfg. Co. dis 50&10&2 %
Pull, " " " " dis 50&10&2 %
" Brook's dis 50 %
" Western dis 25&10 %
Call dis 20 %
Cow, Common Wrought dis 20&10 %
" Western dis 30&10 %
" Sargent's dis 60&10 %
" Kentucky "Star" dis 20&10 %
" " Sargent's dis 60&10 %
" Dodge's Genuine Kentucky, new list—
Nos. 0 1 1½ 2 3 4 5 6 Hog } dis
$12.00 10.00 9.00 8.00 6.00 5.00 3.50 2.50 5.00, } 50&10 %
" Yaw's Genuine dis 50 %
" Texas dis 40&10 %
" Wilson's Moore's dis 50 %

Bellows.
Blacksmiths', Common dis 45 %
" Extra and Pittsburgh Pattern dis 20 %
Moulders' dis 25 %
Hand Bellows dis 20 %

Bit Holders.
Extension, Barber's ₩ doz $15.00—dis 40&5 %
" Ives' ₩ doz $15.00—dis 40 %
Diagonal ₩ doz $24.00—dis 40 %
Angular ₩ doz $24.00—dis 40 %

Blind Adjusters.—Domestic. ₩ doz $8.00. dis 20 %

Blind Fasteners.—Mackrell's dis 30 %
Van Sand's No. 2000, $14.00, dis 40&7½ %
" old pattern ₩ gross, $10.50, dis 20&10 %
Washburn's Patent ₩ gross $14.00, dis 25 @ 30 %
Merriman's new list net

Blind Staples.
Boardman's Patent, ¼ in. and larger ₩ lb 23c dis 10&2 %
⅜ in. ₩ lb 30c dis 10&2 %

Blocks.—Burr & Co. dis 25 %
Differential Pulley Blocks dis 20 %
Penfield Block Works, Rope and Iron Strap'd. dis 40 %
" " Wrot. Iron Com. bushed dis 30 %
" " " all steel roll'r. dis 15 %
" " Sheaves " dis 30 %

Bolts.
Cast Iron Barrel, Shutter, &c. dis 60&10 %
Cast Iron Chain (Sargent's list) dis 60&10 %
Bush's Lever and Chain Bolts dis 40, 10&10 %
Wrought Iron Barrel dis 50, 10&10 %
" " Square dis 50, 10&10 %
" " Shutter (Stanley's list) dis 50 %
" " " (Sargent's list) dis 50, 10&10 %
" " Sunk Flush, Sargent's dis 50&10&10 %
" " " Stanley's dis 15&10 %
" " B.K.Flush, Comm'n, Stanley's dis 30&10 %
" " " Ex. Heavy, " dis 20&10 %
" " Plated Knob & Slide Flush " dis 10&10 %
Carriage and Tire, Common dis 75&3 % cash
" " Norway Iron dis 70 %
" " R. B. & W (old list) dis 70&5 %
" " Philadelphia dis 70 %
" Coleman dis 60&10 @ 60&20 %
" Shelton's (old list, dis 70&5 %
Tire, Am. Screw Co.'s, Phila dis 70&5 @ 70&10 %
" "Bay State" dis 75&10 @ 80 %
Star (Phila) dis 60&10@60&20 %
Union Nut Company dis 70 %
Stove—American Screw Co.'s dis 55&5 @ 60 %
" R. B. & W dis 60&10&5 %
" Union Nut Co dis 50 %
Plow dis 50 %
Machine dis 70&5 %
Bolt Ends dis 60 %

Borax 10@11c ₩ lb net

Boring Machines.

	Upright.	Angular.
First quality, no Augers	$5.50	$7.50 dis 40&10 %
" with Augers	9.00	11.00 dis 40&10 %
Second quality no Augers	2.35	4.00 net
" with Augers	4.00	4.65 net
Snell's, no Augers	4.75	6.25 dis 40 %
Phillips' with Augers		10.00 dis 35 %

Bow Pins.
Union Nut Co. dis 60&10 %
Hotchkiss' low list dis 10 %
Humason, Beckley & Co.'s dis 60 %
Sargent & Co.'s $12.50 and $21.40, dis 60&10 %

Braces.—Barter's Patent dis 40&5 %
O. S. Backus dis 40&10 %
Wilson Mfg. Co. dis 10 %
Spofford's Patent dis 50&5 %
Noble & Patent dis 40&5 %
Ives' "Centennial" dis 40 %
Common Ball (American) dis 34&10 %

Brackets.—Shelf (Sargent's) dis 60&10 @ 60&10&5 %
Bering T. & S. Mfg. Co.'s dis 33⅓ %

Bright Wire Goods. dis 60&10 %

Bull Rings.—Union Nut Co. dis 50&20 %
Sargent's dis 66⅔&10 %
Hotchkiss' low list dis 10 %
Humason, Beckley & Co.'s dis 60 %
Union Nut Co. dis 60&10 %

Butts.
Wrought Brass dis 60 %
Cast Brass, Tiebout's dis 40 %
" Corbin's dis 50&10 %
COMMON CAST, NOT DRILLED.
Fast Joint, Narrow dis 60&10 %
" Broad dis 60&10 %
Parliament Butts dis
Bayer's Hinges dis
DRILLED AND FIRED.
Fast Joint, Narrow dis 55&10 %
" Broad dis 60&10 %
" Broad, Japanned dis
Loose Joint
" Japanned
" with Acorns } dis 70&10 %
Parliament Butts dis 62½&10 %
Bayer's Hinges dis 72½&10 %
Loose Pin no Acorns dis 70&10 %
" " Acorns dis 70&10 %
" " Japanned dis 75&10 %
" " Plated Tips dis 70&10 %
Union Mfg. Co.'s Fancy Butts—
Figured Enameled Loose Joint dis 60&10 %
Boston Finish, Plain dis 80&10 %
" " with Iron Acorns dis 75&10 %
" " with Silvered Acorns dis 70&10 %

WROUGHT IRON.

Fast Joint Narrow dis 40&10 %
" Lt. Narrow dis 35&10 %
" Broad dis 40&10 %
Loose Joint, Broad dis 40&10 %
Table Butts, Back Flaps &c. dis 35&10 %
Inside Blind, Regular dis 30&10 %
" Light dis 40&10 %
Loose Pin, Wrt dis 50&10 %
Spring Hinges:
American Spiral Spring Butt Co., Jap'd dis 25 %
" " " " Fancy dis 10 %
Sabin Mfg. Co.'s Double Acting dis 35 %
Centennial, Japanned dis 25 %
" Ornamental dis 20 %
Union Spring Hinge Co.'s dis 25 %
American Spring Hinge Co.'s dis 25 %
Union Mfg. Co. dis 25 %
Bommer's dis 25 %
Blind Butts, Parker dis 70&10 %
" Palmer dis 40&5&10 %
" Seymour dis 60&10&10 %
" Shepard dis 70&10 %
" Lull & Porter dis 40&10 %
" Nicholson dis 40&10 %
" Huffer dis 40&10 %
" Clark's, Nos. 1, 2, 3, 4, and 45 dis 60&10 %
" Buffalo "Noiseless" dis 75 %
" Sargent's dis 70&10&10 %

Butchers' Cleavers.
Humason & Beckley Mfg. Co. dis 20 %
D. R. Barton Tool Co. dis 20 %
Bradley's dis 25 %
Beatty's dis 25 %

1	2	3	4	5	6	7	8
$16.50	19.00	21.50	24.00	27.00	30.00	33.50	36.50

Hart Mfg. Co. dis 50&10 %

0	1	2	3	4	5	6
$20.00	26.00	29.50	33.00	37.00	41.50	45.00

Can Openers.
Messenger's Comet ₩ doz $3.00, dis 20 %
American ₩ doz $2.25, dis 65&10 %
Lyman's ₩ doz $3.75, dis 20 %
Poole ₩ doz $3.75, dis 40 %
No. 4, French ₩ doz $2.25, dis 50 %
No. 5, Iron Handle ₩ doz $0.75 net
Eureka ₩ doz $2.50, dis 10 %
Sardine Scissors ₩ doz $7.00, dis 45&10 %
Star ₩ doz $5.00, dis 25 %

Caps—Percussion, ₩ 1000.
Hicks & Goldmark's G. D. & S. R. 45c
" " E. B. 1-10 Ground 70c, dis 5 %
" " E. B. 1-10 Turned 65c, dis 5 %
" " D. W. P. 1-10 $1.40, dis 5 %
" " D. W. P. ¾ 1.35, dis 5 %
" " Colt's 1-10 70c, dis 5 %
Ely's E. B 1-10s, 65 @ 68c. gold
" Double Waterproof, 1-4s, $1.50; 1-10s, $1.58c, gold
Colt's 1-10s, 80c gold

Cartridges.—Metallic dis 60&7 %
Cards.—Horse and Curry dis 25&10 %
Cotton dis 25&10 %
Wool dis 25&10 %
Car Pusher.—"Giant" $6.25 each, dis 20 %

Carpet Stretchers.
Cast Steel, Polished ₩ doz $5.00, dis 30 %
" Iron, Steel Points ₩ doz $2.00, dis 45&5 %

Casters.
Bed dis 55 %
Plate and Shallow Socket dis 55 %
Deep Socket dis 40 %

Cattle Leaders.
Hotchkiss' Sons' dis 10&10 %
Hunmason, Beckley & Co.'s dis 60 %
Sargent's dis 60&10&10 %
Union Nut Co. dis 60&10 %

Chain.
Trace, ⅝-1-2 by the cask, ₩ pair 45 @ 46c
" ⅝-10-3 by the cask, ₩ pair 43 @ 44c
" 7-10-2 by the cask, ₩ pair 49 @ 50c
German Halter Chain dis 40 @ 40&10 % gold
" Coil dis 40 @ 40&10 % gold
Galvanized Pump Chain ₩ lb 10½c dis 10 %
Jack Chain, Iron dis 60&10 %
" Brass dis 55&10 %

Chalk.
White ₩ gross 55c net
Red ₩ gross 75c net
Blue ₩ gross 90c net
White Crayons ₩ gross 13½c net

Chisels.
D. R. Barton Tool Co. (all kinds) dis 20 %
Socket Framing, Crossman dis 60&10 %
" " Buck Bros. new list, dis 25 %
" " Hart Mfg. Co. dis 65&5&10&2 %
" " Merrill dis 60&10 %
" " Witherby Tool Co. dis 65&10 %
" " Douglass' dis 70 %
" Firmers, Crossman dis 60&7½&10 %
" " Buck Bros. new list, dis 25 %
" " Hart Mfg. Co., extra dis 65&5&10&2 %
" " Merrill dis 70 %
" " Witherby Tool Co. dis 70 %
" " Douglass' dis 70&5 %
" Corner dis 65&5&70 %
Tanged Firmers Extra dis 40 %
" " Butcher's $5.00 @ $5.25 to £ gold
" " Newbould's 5.50 to £ gold
" " Spear & Jackson's 5.00 to £ gold
" " Buck Bros (Shank) 5.00 to £ gold

Clamps.
Iron, Providence Tool Co.'s, Wrt. Iron dis 25 %
" Adjustable, Gray's dis 20 %
" " Lambert's dis 20 %
" " Snow's dis 40&5 %
" " Hammer's dis 15 %
" " Stearns' dis 15&10 %
" Cabinet, Sargent's dis 60&10&10 %
" Carriage Makers', Sargent's dis 60&10&10 %
" Cord and Tape (T. & S. Mfg. Co.) dis 30 %

Clips, Axle.
Norway or Best dis 60 %
Superior dis 60&10 %

Cockeyes ¼ in., 28c.; 1⅜ inch, 33c.; 1½ in., 37c, net

Cocks, Brass.
Racking, new list dis 50 %
Globe, " dis 50 %
Plain Bibbs, " dis 50 %
Ale and Beer, new list dis 50 %

Coffee Mills.
Board and Box dis 20@25 %
Increase Wilson's net
Selsor's Pat $2.50, $10.50, dis 25 %
American (Enterprise Mfg. Co.) dis 20 %
French Steel dis 20 %
The Swift (Lane Bros.) dis 25 %

Combined Dinner Pail and Lantern.
B'r doz $10.00 dis 30 %

Compasses, Dividers, &c.
Compasses dis 35&10 %
Callipers dis 45&10 %
Dividers dis 55 %
Bemis & Call Co.'s Dividers dis 60 %
Bemis & Call Co.'s Compasses & Callipers dis 45&5 %
Cook's dis 15 %
Excelsior dis 50 %
Miller's Patent dis 25 %

Coopers' Tools.
Bradley's dis 15 @ 20 %
D. R. Barton Tool Co. per doz $5.00, dis 65&10&10 %

Corkscrews.—Humason & B dis 33⅓%

Corn Knives and Cutters.—Bradley's dis 10 %

Crow Bars.
Cast Steel ₩ lb 9c net
Iron, Steel Points ₩ lb 5c
Crucibles.—Gautier & Co ₩ No. 15c

Curling Irons, &c.
¼, ⅜ & ½ in., $1.80, 2.00, 2.40 dis 10 %
Curling Tongs ₩ doz $3.60, dis 10 %
Pinching Irons ₩ doz 7.50, dis 20 %

Curry Combs.
Curry Comb Mfg. Co. dis 25&10 %
Fitch's (List of No. 240, $2). dis 33⅓&10 %
Hotchkiss' & Kellogg's, Iron & Brass, old list. dis 40&7½ %
Hotchkiss' Novelty dis 20&10 %
Rubber ₩ doz $9.00, dis 20&10 %

Curtain Pins.—Silvered Glass dis 15 %
White Enamel dis 15 %

Cutlery.
Meriden Cutlery Co. (Table) net
Am. Miller Bro.'s Cutlery Co. dis 25 %
Humason & Beckley, Pocket dis 25 %
Naugatuck Cutlery Co. list net
New York Knife Co. (Pocket) dis 35&5 % cash
" " (Table) net

Dog Collars.
Embossed Glit dis 20 %
Leather dis 30 %
Brass dis 25 %

Door Springs.
Torrey's Rod ₩ doz $2.00, dis 10 %
Gray's " ₩ doz $1.65, net
Johnson's Rod ₩ doz 3.00, net

Gem (Coil)—
No. 1, Large, Japanned ₩ doz $3.50
No. 2, Medium, " ₩ doz 2.50 } dis 10 %
No. 3, Small, " ₩ doz 2.00
Challenge (Coil)— Nos. 9 7 6
Japanned ₩ doz $2.00 2.50 3.50
Coppered ₩ doz 4.00 4.50 5.00 } dis 30 %
Galvanized ₩ doz 3.50 4.00 4.50
Nickeled ₩ doz 5.50 6.00 7.00
Premium (Coil)— Nos. 1 2 3
Japanned ₩ doz $7.00 6.25 5.00
Nickeled ₩ doz 11.00 9.50 8.00 } dis 30 %
Star (Coil)—For Cop'd, Nickel-Plated, &c. see list.
No. 4, ("anoo Fly") Screen door size ₩ doz $1.80
No. 5, Screen Door Size ₩ doz $2.00
No. 6, Medium ₩ doz 2.50 } dis 30 %
No. 7, Large ₩ doz 3.50
Sabin's Lever..No. 1, $1; 2, $1.50; 3, $2; 4, $2.50; dis 30 %
Sabin's Boss ₩ doz $4.20, dis 40&10 %
Philadelphia 5 in., $5.00; 8 in., $7.00, dis 35 %
Barker's Concealed dis 20 %
Cowell's No. 1, $12.00; No. 2, $15.00 ₩ doz. dis 50 %
Rubber, complete ₩ doz $1.90, net

Drawing Knives.
Crossman's No. 1 dis 60&10 %
D. R. Barton Tool Co. dis 20 %
Hart Mfg. Co., extra dis 60&5&10&2 %
Merrill dis 60&10 %
Nobles Mfg. Co dis 15 %
Bradley's dis 35 %
Adjustable Handle dis 20 %
Witherby Tool Co. dis 65&10 %
Douglass dis 70 %

Drills and Drill Stocks.
Blacksmiths' each $2.15 net
" Self-Feeding each $7.40, dis 10 %
Breast, P. S & W dis 25 %
" Hotchkiss dis 20 %
" Wilson's dis 20 %
" Miller's Falls each $2.60, dis 25 %
Ratchet, Merrill's dis 25 %
" Ingersoll's (old list) dis 35 %
" Whitney's dis 30 %
" Weston's dis 20 %
" Moore's Triple Action dis 20 @ 25 %
Whitney's Hand Drill dis 20&10 %
Wilson's Drill Stocks dis 10 %
Automatic Boring Tools each $2.75, dis 30 %

Drill Chucks.—Morse's Beach Patent dis 30 %
" Adjust. each $10.00, dis 20 %
Danbury $8.00, dis 30 %

Egg Beaters.
Dover ₩ doz $4.00, dis 20 %
Family ₩ doz $3.00 net
National ₩ doz $4.50, dis 33⅓ %

Elevator Buckets.
Mill E. Buckets, light, 3½ to 10 in., (Duc's Improved) ₩ 100 $15.00 @ $44.00, net
Mill E. Buckets, heavy, 5 to 10 inches (Duc's Improved) ₩ doz $4.50 @ $10.20, net
Storehouse, (Duc's Patent) 12 to 17, $12.00 @ $20.00 net

Emery and Emery Paper.
Genuine Chester—Regular Nos. ₩ lb 6c
" " Flour and FF ₩ lb 5c
" " in 10-lb. cans 1c extra
Washington Mills—Regular Nos. ₩ lb 8c
" " Flour ₩ lb 4c
Wellington Mills, Grain ₩ lb 10c net
" " Flour ₩ lb 8c net
Hampden Emery Grain 5c net
" " Flour 9c net
B. & A. Emery Paper dis 15 @ 20 %

Enameled and Tinned Ware.
Kettles dis 45 %
Sauce Pans dis 35 %
Tinned Sauce Pans dis 35 %

Escutcheon Pins.
Iron dis 33⅓ %
Brass dis 33⅓ %

Escutcheons.
Door Lock Same discounts as Door Locks
Brass Thread dis 60&10 %
Wood dis 25 %

Faucets.
Fenn's dis 40 %
Fenn's Cork Stops dis 40 %
Star dis 45&10 %
Frary's Patent Petroleum dis 20&10 %
Wood and Metallic dis 40 %
West's Patent Key dis 40 %
Metallic Key, Leather Lined dis 20&10 %
Cork Lined dis 70&10 %
Enterprise (Self Measuring) ₩ doz, $30.00, dis 20 %

Felloe Plates ₩ lb 15c, dis 50 %

Files.
American File Co $5.00 to £ currency, dis 35 %
Auburn $4.00 to £ currency, dis 25 %
Arcade $5.00 to £ currency, dis 35 %
G. & H. Barnett dis 25 %
Nicholson (Nicholson List) dis 35 %
Heller & Bros $5.00 to £ currency, dis 20 %
Madden & Cockayne File Co $5.00 to £ cur., dis 25 %
Jowitt's $4.50 to £ gold
J. & Riley Carr 4.50 to £ gold
Stubs' $7.00 @ 7.50 to £ gold
Butcher's 4.50 to £ gold
Walter Spencer & Co.'s "Diamond" 4.50 to £ gold
Fisher's 4.75 to £ gold
Moss & Gamble 4.50 to £ gold
R. Disston & Sons (new list) dis 35 %
Limet & Co. (French) $4.25 to £ gold
Boynton's Cast dis 40 %

Fluting Machines.
Knox, 4-inch Rolls $2.10 each net
" 6 " $2.50 each net
" 8 " 4.00 each net
Peerless, 4-inch Rolls 4.00 each net
" 5 " 4.75 each net
Eagle, 3½-inch Roll $30.00 ₩ doz, dis 50 %
" 5¼ " 40.00 ₩ doz, dis 50 %
Eureka, No. 1, 7-inch Roll 6.50 each, dis 33⅓ %
" No. 2 4-inch Roll 5.50 each, dis 33⅓ %
Crown, 4½-in. Roll, $4; 5-in., $4.75; 8-in., $7.25 each, dis 50 %
Champion, 4 in., $2.15; 6-in., $2.50; 8-in., $4.00 each net
Domestic Fluter 1.50 each net
Geneva Hand Fluter $15.00 ₩ doz, dis 10 %
Shepard Hand Fluter No. 75 ₩ doz $15, dis 10 %
" " No. 104, ₩ doz $12.00 net
Combined Fluter and Sad Iron ₩ doz 15.00, dis 10 %
Buffalo ₩ doz 10.00, dis 10 %

Fluting Scissors dis 45&10 %

Forges—KeystonePortable Forge Co dis 20 %

Forks.
Hay, Manure and Spading new list, dis 15 %
Plated" A 1, Rogers & Bro dis 40&5 % cash
" Reed & Barton dis 40&5 %

Fruit and Jelly Presses.
Enterprise Mfg. Co. dis 20 %

Fry Pans.
Burnished, list as follows dis 60&5 %

No.	0	1	2	3	4	5	6	7	8
₩ doz	$3.00	$3.75	4.25	4.75	5.25	6.00	7.00	8.00	9.00

Acme Patent, same list as above dis 40 %

Gauges.
Making, Stanley's dis 45&10 %
" Chapin's dis 50&10 %
" Star dis 35 %
Wire dis 10 %
" Smith's Patent ₩ doz $18.00, dis 40 %

Gimlets.
Nail and Spike dis 45 %
"Bee" Gimlets ₩ gross $12.00, dis 45 %
"Eureka" Gimlets dis 60 %
"Diamond" Gimlets dis 20&10 %
Double Cut, Shepardson's dis 40 %
" " Hartwell's dis 50 %
" " Ives' dis 40&10 %
" " Douglass' dis 40 %

Glue Pots.
Tinned and Enameled dis 45 %
Family, Howe's "Eureka" dis 30 %
" L. F. & C.'s "Handy" dis 40 %

Grindstone Fixtures.
Sargent's Patent dis 70&10&10 %
Reading Hardware Co dis 40&10&2 %
" " "Keystone" dis 40&10&2 %
Hart Mfg. Co., Nos 9 to 11 dis 60&10 %

Hammers.
Maydole's dis 15 %
Cheney's Steel Face and Claw dis 10 %
" all Steel dis 20&10 %
H. Hammonds dis 20 %
Verree dis 5 %
Magnetic Tack dis 25&10 %
Warner & Noble's dis 10 %
Yerkes & Plumb's dis 30 %
Kip's (new list, Sept. '78) dis 33⅓ %

Hand Cuffs and Leg Irons.
Providence Tool Co.'s Hand Cuffs, $15.00 ₩ doz } dis 10 %
" " Leg Irons, $25 ₩ doz }
Tower's dis 25 %

Handles.—Door or Thumb Latches—

Nos	0	1	2	3	4	
Per doz	$0.80	1.00	1.18	1 35	1.50	dis 65&10 %

Roggin's Latches net
Bronzed Iron Drop Latches ₩ doz $2.85 @ $1.00 net
Jap'd Store Door Handles—Nut4, $1.10; Plate $0.95 no Plate, 75c net
Barn Door per doz $5.00, dis 65&10&10 %
Wrought Chest dis 60&10 %
Eureka, Tinned ₩ doz $8.00, dis 10 %
Dunlap's Improved ₩ doz $4.00 net
Sammis'...No. 1, $7.50; No. 2, $12.00 ₩ doz., dis 25&10 %
Townsend's Patent $5.00 ₩ doz., dis 33⅓ %

Lines.—Linen Fish dis 25 %
Cotton Chalk dis 50 %
Sil. Lake Chalk...Nos. 0, 1, 2, 3, $6.00, $6.50, $7.00, $7.50 dis 30 %
Mason's Linen dis 20 %
Wire Clothes, Galvanized each 90 @ 100 net

Locks and Latches.
Cabinet—Gaylord } dis 25&2 %
" Eagle }
" Barnes & Deitz dis 30 %
" Bridgeport Lock Co. dis 25&2 %
Trunk dis 25 %
Langstroth & Crane's List Jan. 1, '77. dis 40&10 %
Round Key dis 33⅓&10 %
Flat Key dis 30 %
Barnes & Deitz, Flat Key dis 40 %
Yale Lock Co., Flat Key dis 35 %
Shepardson's, Flat Key dis 33⅓ %
American Lock Mfg. Co. dis 33⅓ %
Plate dis 33⅓&5&2 %
F. Many's "Extension Cylinder" $10.50 ₩ doz, net

DOOR LOCKS, &c.

Branford dis 60&10&2 %
Norwalk dis 50&10&2 %
Norwich dis 50&10&2 %
Russell & Erwin dis 70&2 %
Mallory, Wheeler & Co. dis 35&10&2 %
Reading Hardware Co. dis 35&10&2 %
Trenton dis 40&5&2 %
Continental dis 33⅓ %
Padlocks—Russell & Erwin } dis 33⅓&5 %
" Mallory, Wheeler & Co. } and 2 % for cash
" Wm. Wilcox & Co.
" American Lock Mfg. Co. dis 33⅓ %
" Romer's dis 30 %
" Conestoga dis 60 %
" J. H. McWilliams dis 10 %
" Barnes & Dietz dis 30 %
" Penn Lock Works dis 30 %

Mallets.—Hickory and Lignumvitæ dis 30 %

Meat Cutters.
Dixon's (P. S. & W.) Nos. 1 2 3 4
₩ doz. $14.00 17.00 19.00 30.00—dl 25
Miles' Challenge Nos. 1 2 3
₩ doz. $22.00 30.00 40.00—dis 30 %
Perry's Nos. 1 2 3 4 4 Std 5 Std
Each $3.00 4.00 5.00 11.00 13.00 36.00—dis 40 %
Woodruff's (P. S. & W.) Nos. 100 120
₩ doz. $15.00 18.00—dis 40 %
Hales' Nos. 11 12 13
₩ doz. $33.00 40.00 51.00—dis 50&2 %
Draw Cut Nos. 5 2 6 8 10
Each $50.00 75.00 80.00 225.00 400.00—dis 20 %
American dis 25 %
Nos. 1 2 3 4 B 5
Each $5.00 7.00 10.00 25.00 50.00 60.00
Molasses Gates.
Stebbins Pattern dis 62½&10 %
" Genuine dis 60&10 %
" Tinned Ends dis 40&10 %
Chase's Hard Metal dis 30 %
Bush's dis 20 %
Lincoln's Genuine dis 62½&10 %
Wood's dis 15 %
Lath, Nos. 1 2 3 ₩ doz 8.50 8.00 7.50
Hunters' ₩ doz 10.50
M. H. Jones & Co. dis 40&5 %
Shingling, Nos. 1 2 3 ₩ doz $3.00 $2.50 $2.00
Half Hatchets, Nos. 1 2 3 ₩ doz 8.00 8.50 9.00
Claw, Nos. 1 2 3 ₩ doz 9.00 9.50 10.00
Lathing, Nos. 1 2 3 ₩ doz 8.00 8.50 9.00
Broad, Nos. 2 3 4 ₩ doz 11.00 12.00 14.50
" Nos. 5 6 7 ₩ doz 16.50 18.00 19.50

Hay Knives.
"Lightning" ₩ doz $20.00 net
Wadsworth's dis 30 %

Hinges.
Gate, Western ₩ doz $6.25, dis 60&10 %
" N. E. ₩ doz $10.13, dis 60&5&10 %
" N. E. Reversible ₩ doz $6.50, dis 60&10 %
Gate, Clark's No. 1 ₩ doz $6.00, dis 50 %
" N. Y. State ₩ doz $7.20, dis 60&10 %
" Automatic ₩ doz $12.50 dis 40 %
" Common Sense dis 20 %
" Seymour's dis 40&10 %
" Shepard's No. 21 ₩ doz $6.00, dis 50 %
Rolled Blind Hinges dis 60&10 %
Rolled Plate dis 70&10 %
Rolled Raised dis 70&10 %
Wrought Strap and T, list Dec. 20, '77 dis 60&10 %
Plate Hinges { 6 to 10 in. 5½c ₩ lb { dis 10 %
"Providence" { over 10 in. 4¾c ₩ lb {
Screw Hook and Strap { 8, 10, 12 in., 11c { dis 50&10 %
{ 14 to 36 in., 9½c {
Heavy Welded Hook { 8 to 12 in., 11 c { dis 30 %
{ 14 in. & up, 9½c {
Screw Hook and Eye { ⅜ & 1 in., 10c / ½ in., 12c / ⅝ in., 14c / ¾ in., 16c } dis 35 %

Hoes.—Solid Shank, C. S. ₩ doz $5.25, dis 15 %
Socket ₩ doz 4.75, dis 15 %
Riveted Shank ₩ doz 3.25 dis 15 %
Grub dis 30 %
Planters' dis 30 @ 35 %
Scovill Pattern dis 25 @ 30 %
Scovill Pattern, Handled dis 25 %
Hick's Pat. Solid C. S. Planters' dis 20&10 @ 30 %
" " Scovill Pattern dis 20&2 @ 35 %
Winsted & Lane, Planters dis 25@30 %
" " Scovill Pattern dis 20@25 %

Hooks.
Bird Cage, Sargent's list dis 10&10&10 %
Cotton dis 50 %
Cotton (Humason & Beckley Mfg. Co.) dis 25 %
Belt, (new list) ₩ c dis 30&10 %
Bench—Hotchkiss' $5.00 ₩ doz dis 10 %
" Weston's, No. 1, $10.00; No. 2, $9.00 ₩ doz dis 25 %
" McGill's, $3.00 ₩ doz dis 10 %
" Skinner's, $6.25 per doz dis 20 %
Clothes Line, Hart's list dis 60&10&5&10 %
" Sargent's list dis 66⅔&10 %
" Reading list dis 45&10&2 %
Ceiling, Harness { Hart's list dis 70&10 %
{ Sargent's list dis 70&10 %
{ Reading list dis 45&10&2 %
Coat and Hat, Hart's list dis 66⅔&10 %
" " Sargent's list dis 66⅔&2 %
" " Reading dis 45&10&2 %
" " T. & S. Mfg. Co's list dis 25 %
Tassel (T. & S. Mfg. Co.) dis 40 %
Wrought Staples and Hooks and Staples, dis 75 @ 75&10 %
" Staples, Stanley's list dis 40 %
Wire Screw Hooks and Eyes dis 70&10 %
Grass and Bush dis 40 %
Whiffletree—Patent dis 40 %
Hooks and Eye—Malleable Iron dis 60&10&10 %
" Brass dis 60&10&10 %

Horse Nails

	Nos. 5	6	7	8	9	10	
Ausable ₩ lb	30c	27c	24c	24c	23c	22c	} dis 20 %
" Finished, Polished or Blued	31c	28c	26c	25c	24c	23c	

	Nos. 5	6	7	8	9	10	
Bridgewater Iron Co.	26c	23c	21c	20c	19c	18c	} dis 20 %
Pointed and Polished	26c	23c	21c	20c	19c	18c	

	Nos. 5	6	7	8	9	10	
Cortland	29c	26c	24c	23c	22c	21c	} dis 15 %
" P't'd & Blued	31c	28c	26c	25c	24c	23c	

	Nos.	5	6	7	8	9	10	
Globe (New list)		28	25	23	21	20	19	} dis 20 %
H. P. Pointed and Finished		26	23	21	20	19	18	
North Western Fin'h'd Plain		26	23	21	20	19	18c	net
		25	22	20	19	18	17c	net
National, Pointed and Polished, Pat. Fin.			25	23	22	21	20c	net
Putnam Hammer, P't'd		26	23	21	20	19	18c	net
Vulcan P't'd & Blued		26	23	21	20	19	18c	net

Horse Shoes.—Burden keg $3.62½
R. I. Horse Shoe Co., Perkins' Improved Light, ₩ keg 3.62½
Medium and Heavy ₩ keg 4.62½
Mule Shoes ₩ keg 4.62½
Perkins' Snow ₩ keg 4.12½

Ice Awls, Chisels, &c.
American Ice Chisel ₩ doz $6.00 dis 45 %
National ₩ doz $6.25, dis 20 %
Novelty Ice Breakers ₩ doz $6.25 dis 20 %
White's Sliding Head Picks ₩ doz $2.50 dis 30 %
Dunlap's

Saw Sets.
Boynton's Patent ..... dis 40 %
Stillman's Genuine ..... ₩ doz $4.25 net
" Imitation ..... ₩ doz $3.25, dis 25 %
Common Lever ..... per doz $2.00, dis 25 %
Leach's ..... No. 0, $8.00; No. 1, $15.00, dis 15 %
Nash's ..... No. 1, $3.50; No. 2, $5.50, dis 20&10 %
Hammer, Hotchkiss ..... $8.50, dis 10 %
" Bemis & Call Co.'s New Pat. ..... dis 40 %
Bemis & Call Co.'s New Pat. Lever ..... dis 20&10 %
Aiken's Genuine ..... $13.00, dis 40&10 %
" Imitation ..... $7.00, dis 40 %
Hart's Patent Lever ..... dis 20 %
Disston's ..... dis 20 %

Scales.
Hatch, Counter ..... ₩ doz $36, dis 40&2 %
" Tea ..... ₩ doz $15.00 dis 50 %
Union Platform ..... $6.00, dis 50 %
Turnbull's Market ..... dis 20 %
Fairbanks' ..... dis 20&5 %
Howe's ..... dis 20&5 %
Chatillon's Grocers' ..... dis 40 %
" Eureka ..... dis 20 %
Family Universal ..... dis 25 %
" Favorite ..... dis 25 %
" Turnbull's ..... dis 25 %
Scale Beams, Chatillon's list ..... dis 25 %
" Sargent's list ..... dis 60&10 %

Scrapers.
Box, 1 Handle ..... ₩ doz $5.00, dis 10 %
" 2 " ..... ₩ doz 6.00 dis 10 %
Defiance Box and Ship ..... dis 25&10 %
Foot ..... dis 60&10 %
Ship (common) ..... per doz $3.00 net
" (Providence Tool Co ..... dis 10 %

Screw Drivers.
Hart, Biven & Mead, new list ..... dis 45&10&2 %
Douglass Mfg. Co ..... dis 35&10 %
Disston's ..... dis 50 %
Disston's Patent Excelsior ..... dis 60 %
Buck Bros ..... dis 25 %
Stanley Rule & Level Cos., Black Handles ..... dis 35&10 %
" " " Varnished H'le ..... dis 45&10 %
Sargent & Co.'s ..... dis 60&10 %

Screws.
Flat H'd Iron ..... dis 60 %
Round Head Iron ..... dis 45 %
Flat Head Brass ..... dis 45 %
Round Head Brass ..... dis 30 %
Brass and Silver Capped ..... dis 40 %
Japanned, list of Plain Screws ..... dis 50 %
Lag or Common Coach ..... dis 70&5 %
Coach Patent Gimlet Point ..... dis 40 @ 45 %
Bed ..... dis 10 %
Machine, Flat Head, Iron, Am. Screw Co ..... dis 25 %
" Round Head, Iron, " " ..... dis 20 %
Bench, Iron ..... dis 60&10 %
" Wood, Beach ..... ₩ doz $3.00, net
" Hickory ..... dis 20&10 %
Hand ..... dis 25&10 %
Hand Rail, Sargent's ..... dis 60&10 %
" Humason, Beckley & Co.'s ..... dis 40&10 %
Jack Bell Bottom ..... dis 20 %
Jack ("Wilson's") ..... dis 30 %
Sash (T. & S. Mfg. Co.) ..... dis 25 %

Shears and Scissors.
Cast Steel ..... dis 80 %
" Iron, "American" ..... dis 50 @ 55 %
Seymour's Straight Trimmers ..... dis 65 %
" Scissors ..... dis 65 %
Pruning ..... see Pruning Hooks and Shears.
Barnard's Lamp Trimmers ..... ₩ doz $3.75
Tinners' ..... dis 20 %
Heinisch Trimmers and Scissors ..... dis 60 %
" R. H. S. " " ..... dis 65 %

Sheaves.
Sliding Door, M. W. & Co., list ..... dis 35&10&2 %
" R. & E. list ..... dis 50&2 %
" Patent Roller ..... dis 20&2 %
" " " Hatfield's ..... dis 50&2 %
" Russell's Anti-Friction ..... dis 50&2 %
" Moore's Anti-Friction ..... dis 45 %
Sliding Shutter, R. & E. list ..... dis 50&2 %
" " Sargent's list ..... dis 25&10 %
Moore's Anti-Friction ..... dis 45 %
Philadelphia, Hanging ..... dis 40&5&2 %

Shovels and Spades.
Ames ..... dis 32½ %
" stamped "Ames" ..... dis 37½ %
Kimball Shovel Co ..... dis 20 @ 20&5 %
Old Colony ..... dis 30 %
Remington's (Lowman's Patent) ..... dis 30 %
Dunning's Shovels and Scoops ..... dis 30&7½ %
Rowland's "Regular," new list ..... dis 60 %
" Patent, new list ..... dis 40&5 %
Oxford Patent, new list ..... dis 40&5 %

Shovels and Tongs.
Iron and Brass Head, L. & E. list ..... dis 50&2 %
" Hart's ..... dis 50&10&2 %
Polished Steel ..... new list, dis 50&10&2 %

Slates.
Square Frames, Round Cornered, by case ..... dis 70 %
Less than a case ..... dis 65&10 %

Spoke Shaves.
Defiance Metallic ..... new list, dis 25&10 %
Iron ..... dis 40&10 %
Wood ..... dis 30 %
Bailey's ..... dis 25&10 %

Spoke Trimmers.
Bonney's ..... ₩ doz $10.00, dis 40 %
Stearn's ..... ₩ doz $10.00, dis 40 %
Ives' ..... No. 1, $15.00; No. 2, $12.00 ₩ doz, dis 40&10 %
Douglass' ..... ₩ doz $9.00, dis 20&10 %

Spoons.
Tinned Iron ..... dis 15&5 %
Basting ..... dis 40 %
Britannia ..... dis 60 %
Derby Silver Co ..... dis 40&5&2 %
L Boardman's Sons, A1 ..... dis 40&5&2 %
Rogers & Bro., A 1 ..... dis 40&5 % cash
Reed & Barton ..... dis 40&5 %
Hall & Elton ..... dis 40&5 %
Holmes, Booth & Haydens ..... dis 40&5 %
German Silver ..... dis 30&5 %
Diamond Steel (L. Boardman's Sons) ..... dis 30&5 %
Tin (P. S. & W.), Teas ..... $1.50 ₩ gross, net
" " Tables ..... $2.50 ₩ gross, net
Tin Cowles Hdw. Co.) ..... dis 10 %
" " " case lots ..... dis 20 %

Stocks and Dies.
'Lightning" Screw Plate ..... dis. 10 %

Stone.
Hindostan Stone ..... ₩ ℔ 6c
" Ax Stone ..... ₩ ℔ 8c } dis 30&10 %
" Slips ..... ₩ ℔ 10c
Sand Stone ..... ₩ ℔ 6c, dis 30&10 %
Washita Stone ..... No 1. ₩ ℔ 20c
" No 2, ₩ ℔ 15½c
" Slips ..... No. 1, ₩ ℔ 45c } dis
Arkansas Stone ..... No. 1, ₩ ℔ $1.00 } 10 %
" No. 1, ₩ ℔ $0.85
" Slips ..... No. 1, ₩ ℔ $2.25
Turkey Oil Stone (Boyd & Chase) ..... 4 to 8in, $1.00 ₩ ℔, dis 10 %
" Slips " ..... $2.50 ₩ ℔, dis 10 %
Lake Superior (Boyd & Chase) ..... ₩ ℔ 20c, dis 10&5 %
" " Slips " ..... ₩ ℔ 45c, dis 10&5 %
Grindstones, Family, Loring's ..... dis 10 %

Stove Polish.
Joseph Dixon's ..... ₩ gross $6.00, dis 5 %
Gem ..... ₩ gross $4.50, dis 4 %
Gold Medal ..... ₩ gross $6.00, dis 25 %
"Mirror" ..... ₩ gross $6.00, dis 5 %
Rubv ..... ₩ gross $3.75, net
Rising Sun ..... ₩ gross $5.75, net

Squares.
Steel ..... dis 50 %; full cases, dis 50&10 % } 2 %
Iron ..... dis 50 %; full cases, dis 50&10 % } cash
Nickel Plated ..... add $2.50 @ $4.00 ₩ doz, net }
Try Squares and T Bevels ..... dis 45&10 %
Star Try Squares and Bevels ..... dis 35 %
Disston's Try Squares and T Bevels ..... dis 50 %
Winterbottom's Try and Mitre ..... dis 20&10 %
Bailey's Try Squares and T Bevels ..... dis 25&10 %

Tacks, Brads, &c.
List of May, 1878 ..... dis 55 @ 55&10 %
Shoe Nails, (new list) ..... dis 10 %
Double-Pointed Tacks ..... dis 40&5 %

Tap Borers.
Common and Ring ..... dis 20&10 %
Ives' Tap Borers ..... dis 10&10 %
Enterprise Mfg. Co ..... dis 20 %

Tapes, Measuring.
American ..... dis 25 %
Spring Tapes ..... dis 25&10 %

Thermometers.
Tin Case ..... dis 60&10&10 %

Tobacco Cutters.
Enterprise Mfg. Co. (Champion) ..... dis 20 %
Wood Bottom ..... ₩ doz $12.00, dis 30&10 %
All Iron ..... ₩ doz $10.50, dis 40&5 %
Nashua Lock Co.'s ..... ₩ doz $18.00, dis 50 %

Toe Calks.—Winsted ..... ₩ ℔ 10c. dis 10 %

Tunners' Tools and Machines.
Machines (P. S. & W.) ..... dis 5@10 %
Tools (P. S. & W.) ..... dis 15@20 %

Traps.
Game, Newhouse ..... dis 33½ %
" Newhouse Pattern ..... dis 60&10 %
" Blake's Patent ..... dis 40&10 %
Mouse, Wood, Choker ..... ₩ doz holes, 12 @ 13c
" Patent Choker (Union Nut Co) ..... ₩ doz holes, 16 @ 19c, net
" Round Wire ..... ₩ doz $1.50, dis 10 %
" Cage ..... ₩ doz $2.50, dis 10 %
" Patent Self Setting ..... ₩ doz holes, 25c, net
" Catch-em-alive ..... ₩ doz $2.75, dis 10 %
Rat, "Decoy" ..... per doz $10.00, dis 10 %

Trowels.
Lothrops Brick and Plastering ..... dis 10 %
Reed's Brick and Plastering ..... dis 15 %
Disston's Brick and Plastering ..... dis 20 %
Peace's Plastering ..... dis 20 %
Clement & Maynard's ..... dis 20 %
Rose's Brick ..... dis 15 %
Brades' Brick ..... gold, dis 20 %
Worrall's Brick and Plastering ..... dis 20 %
Garden ..... dis 50 %

Triers.
Butter and Cheese ..... dis 25 %

Vises.
Solid Box, Trenton ..... New List, Nov. 19, '78, dis 10 %
" Wilsons ..... New List, Nov. 19, '78, dis 10 %
" "Crown" (A. H. Hilldicks) 40 to 100 lbs., 15c currency, dis 20 %
" Peter Wrights ..... 15½c, gold
Parallel, Parker's ..... dis 20 %
" Wilson's ..... dis 45 @ 50 %
" Howard's ..... dis 25 %
" Merrill's ..... dis 20 %
" Sargent's ..... dis 60&10 %
" Trenton ..... dis 25 %
" Backus and Union ..... dis 25 %
" Fluher & Norris ..... dis 15&10 %
" Stevens' ..... dis 25 %
" Simpson's Adjustable ..... dis 25&10 %
"Family," List ..... net
Saw Filers, Bonney's ..... ₩ doz $24.00, dis 20&10 %
" Stearn's ..... dis 20&10 %
" Hopkins' ..... ₩ doz $17.50 dis 10 %
Lowell Hand Vises ..... dis 20 %
Richardson's Vise and Anvil ..... dis 25 %

Ventilators.
Protective (upper) per foot, $1.00 } dis 2
" (lower) " 1.50 }

Washer Cutters.
Smith's Patent ..... ₩ doz $12.00 dis 10 %
Johnson's ..... ₩ doz $12.00. dis 20&10 %
Penny's ..... ₩ doz $14.00 and $16.00. dis 35&10 %
Appleton's ..... ₩ doz $8.00, dis 10&10 %

Washers.—See Nuts and Washers.

Weather Strips.
Protective Ventilator Co. 8 ..... dis 25 %

Well Wheels.—Revised list ..... dis 60&10 %

Wire.
Brass and Copper ..... List of July 1, 1878 dis 10 %
Bright and Annealed ..... Nos. 0 @ 18. dis 52½ @ 55 %
" " ..... Nos. 19 @ 26, dis 57½ @ 60 %
" " ..... Nos. 27 @ 70, dis 62½ @ 65 %
Coppered ..... Nos. 0 @ 18, dis 47½ @ 50 %
Galvanized, Nos. 0 to 6 ..... ₩ ℔ 10c, dis 30 @ 35 %
" Nos. 7 to 18 ..... market list, dis 30 @ 35 %
Tinned, Nos. 0 to 18 ..... dis 40 @ 42½ %
Cast Steel ..... dis 25 @ 30 %
Tinned Broom Wire, Nos. 18 to 26 ..... dis 47½ @ 50 %
Annealed Fence, Nos. 8 and 9 ..... dis 55 @ 57½ %
" Grape, Nos. 10 to 14 ..... dis 55 @ 57½ %
Galvanized Telegraph, Nos. 7 to 9 ..... ₩ ℔ 8½c
" " Nos. 10 and 11 ..... ₩ ℔ 9½c
" " No. 12 ..... ₩ ℔ 10c
Fence Staples ..... ₩ ℔ 7 @ 7½c
" Staples, Galvanized ..... ₩ ℔ 9½ @ 10c
Stubs Steel Wire ..... $7.00 to £ gold
Japanned Barb Fence ..... ₩ ℔ 15c
Galvanized " ..... ₩ ℔ 18c
Steel Music Wire, Nos. 12 to 27 ..... ₩ ℔ $1.00. net
Judd's Picture Wire ..... dis 80&20 %
Clothes Line Wire, Galvanized ..... ₩ coil 30 @ 40c net

Wrenches.
American Adjustable ..... dis 45 %
Baxter's Adjustable "S" ..... dis 20 %
" Diagonal ..... dis 20 %
Collins & Co.'s ..... dis 45 %
Coes' Genuine ..... dis 55 @ 60 %
" Pattern (Wrought) ..... dis 70 %
" " (Malleable) ..... dis 75&10 %
Girard ..... dis 50&10&10 %
Lindsay's ..... dis 25 %
Taft's Pattern ..... dis 75&10 %
Davis' Patent Duplex ..... new list, dis 25 %
Bemis & Call's Patent Combination ..... dis 25 %
" " Merrick's Pattern ..... dis 25&2½&20 %
" " Briggs' Pattern ..... dis 25&10 %
" " Cylinder or Gas Pipe ..... dis 25&30 %
Aiken Pocket (Bright) ..... $8.00, dis 55&10 %
The Favorite Pocket (bright) ..... per doz $8, dis 60 %

Wringers. Per Doz.
Universal, Cog Wheels, No. 2½ $60.00
" " " No. 2 ..... 63.00
" " " No. 1½ 71.00
Crown No. 2 ..... 54.00
" No. 2½ 63.00
" No. 3 ..... 69.00
Eureka, No. 1 ..... 57.00
Novelty, No. 10, with Cog Wheels 60.00
" No. 2, ... 63.00
Excelsior, No. A, with Folding Bench 84.00
" No. E, for Set Tubs 66.00
Keystone No. 1, Wood Frame, no Gear 54.00
" No. 2, Iron " " 54.00
" No. 10, Wood " Common Gear 60.00
Peerless, No. 2 ..... 63.00
" No. 3 ..... 71.00
" No. 2½ 60.00

Stamped Tinware.
Common Stamped Ware L. & G. List, April, 1878, dis 50&10 %
Stamped Deep and Retinned Ware, L. & G. List, April, 1878 ..... dis 50&10 %

METALS.

IRON.—DUTY: Bars, 1 to 1¼c. ₩ ℔; Sheet, Band Hoop and Scroll, 1¼ to 1¾c. ₩ ℔; provided, that none of the above Iron shall pay a less rate of duty than 35 per cent. Pig, $7 ₩ ton; Polished Sheet, 3c. ₩ ℔; Wrought Scrap, $8 ₩ ton: Cast Scrap, $6 per ton. Railroad 70c. ₩ 100 ℔s. Boiler and Plate, 1¼c. ₩ ℔.

Pig Iron—AMERICAN.
Foundry No. 1 ..... ₩ ton $16.50 @ 18.00
" No. 2 ..... ₩ ton 14.50 @ 16.50
Gray Forge ..... ₩ ton 14.50 @ 15.50

SCOTCH.
Eglinton ..... ₩ ton 21.00
Coltness ..... ₩ ton 22.00 @ 22.50

Rails.
Iron, at mill ..... ₩ ton $32.00 @ 36.00
Steel, " ..... ₩ ton 41.00 @ 44.00
Old Rails ..... ₩ ton 18.50 @ 19.00

Scrap.
Wrought Scrap, from yard ..... ₩ ton, nom. 20.00 @ 21.00

Bar Iron, from Store.
Common Iron:
¾ to 2 in. round and square } ₩ ℔ 1 75c
1 to 6 in. x ¾ to 1 in. }
Refined Iron:
¾ to 2 in. round and square } ₩ ℔ 2.00c
1 to 6 in. x ¾ to 1 in. }
1 to 6 in. x ½ and 5-16 ..... ₩ ℔ 2.20
Rods—¾ and 11-10 round and square ..... ₩ ℔ 2.10
Bands—1 to 6 x 3-16 to No. 12 ..... ₩ ℔ 2.40
Swedish Iron:
Ordinary sizes ..... c.o

COPPER.—DUTY: Pig, Bar and Ingot, 5c; Old Copper, 4c ₩ ℔; Manufactured (including all articles of which Copper is a component of chief value), 45 % ad valorem.
American Ingot ..... ₩ ℔ See Trade Report.

SHEATHING, BRAZIERS' COPPER, BOLTS, &c.
Braziers' Copper, ordinary sizes, over 16 oz., ₩ sq. ft. ..... ₩ ℔ 25c
Braziers' Copper, ordinary sizes, 16 oz. and over 12 oz., ₩ sq. ft. ..... ₩ ℔ 27c
Braziers Copper, 12 oz. and 12 oz., ₩ sq. ft. ..... ₩ ℔ 29c
" Lighter than 10 oz. ₩ sq. ft .. ₩ ℔ 31c
Circles less than 84 in. in diameter ..... ₩ ℔ 28c
Circles 84 in. diameter and over ..... ₩ ℔ 31c
Segment and Pattern Sheets ..... ₩ ℔ 28c
Locomotive Fire Box Sheets ..... ₩ ℔ 26c
Sheathing Copper, over 12 oz. ₩ sq. ft. ..... ₩ ℔ 23c
Bolt Copper ..... ₩ ℔ 25c
Copper Bottoms ..... ₩ ℔ 25c
No Copper is Sheathing except 14x48 inches and not to exceed 34 oz. to the sq. ft.

TINNING.
14x48, by the case ..... ₩ sheet 6c
14x48, less than case ..... ₩ sheet 8c
For tinning both sides, double the above amount.
O'NEILL'S PATENT PLANISHED COPPER.—Dis 7½ @ 10 %.
14x48.
14 and 16 oz. and heavier ..... ₩ ℔ 34c By the case. ₩ ℔ 33c
12 oz. and lighter ..... ₩ ℔ 37c " " ₩ ℔ 36c
Boiler Sizes.
7 in., 14x52. 8 in., 14x56. 9 in., 14x60.
14 and 16 oz. and heavier. ₩ ℔ 36c By the case. ₩ ℔ 35c
(And all sizes not over 20 in. wide.)
30x60.
14 and 16 oz. and heavier ..... ₩ ℔ 38c
12 oz. ..... ₩ ℔ 41c

Sheet Iron.

	Common American.	R. G. American.
Nos. 10 to 20	₩ ℔ 27½c	4
21 to 24	₩ ℔ 32½c	4
25 to 26	₩ ℔ 34c	4¼
27	₩ ℔ 34½c	4¼
28	₩ ℔ 38½c	4½c
Galvanized, 14 to 20, B. B.	₩ ℔ 6¼c; 2d qual.	₩ ℔ 4½c
" 21 to 24, "	₩ ℔ 7½c; "	₩ ℔ 5 c
" 25 to 26, "	₩ ℔ 7¾c; "	₩ ℔ 6½c
" 27 "	₩ ℔ 8½c; "	₩ ℔ 7 c
" 28 "	₩ ℔ 9 c; "	₩ ℔ 7½c
Patent Planished	₩ ℔ A, 10½c; B, 9½c	
Russia	₩ ℔ Nos. 8 to 12, 15c; 13 to 16, 12 @ 12½c	
American Cold Rolled	₩ ℔ 4½c	

Brass.
Brown & Sharp's Gauge the Standard for Metal; Old English Gauge the Standard for Wire.
BRASS MANUFACTURERS' PRICE LIST.—dis nominal.
July 1, 1878.
Cash prices for Roll and Sheet Brass. For less quantity than 100 ℔s. add 5c ₩ ℔.

HIGH BRASS.
All Nos. not thinner than to No. 28, wider than 2 in., not wider than 14 in. 25c
All Nos. to No. 28, inclusive, and widths over 14 to 20 in., inclusive 30c
All Nos. to No. 28, inclusive, and widths over 20 to 30 in., inclusive 33c
½c. ₩ ℔ advance on each No. above Nos. 28 to 38, inclusive.
All Brass thinner than No. 38 is Platers' Brass, at ... 48c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 in., in width wider than 2 in. 32c
Printers' Rules 40c
Sheets wider than 30 in. and under 40 in. 42c
" 40 in. and over 45c
Circular Sheets, in diam. from 4 in. to 14, inclusive. 34c
" " over 14 " 20, " 40c
" " " 20 " 30, " 44c
" " " 30 " 40, " 50c
" " 40 in. 54c

LOW BRASS.
4c ₩ ℔ more than High Brass,
Gilding Metal, 8c ₩ ℔ more than High Brass.
Platers' or Gold Metal { in Bars 43c
" Sawed 46c
" Planed or Polished 49c

FOR SLITTING.
Metal in width 2 in. to ½ in. to No. 28, inclusive, 1c. ₩ ℔ advance.
Metal, in width 2 in to 1 in., thinner than No. 28, 2c. ₩ ℔ advance.
Metal, in width 1 in. to ½ thinner than No. 28, 3c ₩ ℔ advance.
Metal, in width ½ in. to ¼, inclusive, not thinner than No. 28, 2c. ₩ ℔ advance.
Metal, in width ⅛ in. to ¼ thinner than No. 28, 5c. ₩ ℔ advance.
Metal, ¼ in. in width and less, 10c. ₩ ℔ advance.
Any of the above widths cut to particular lengths, add 7c. ₩ ℔.

GERMAN SILVER MARKET METAL AND WIRE.

	Market Metal.	Wire.
4 per cent., 12 inch, to No. 26	$0.62	$0.70
6 " " "	.67	.76
10 " " "	.84	.88
15 " " "	.74	1.03
18 " " "	.80	1.12

German Silver Sheets over 12 in. wide and weighing more than 10 ℔s., $2.00 ₩ ℔.
Advance 2c. for each additional inch in width above 12 in., and 2c. ₩ ℔ on each No. thinner than Nos. 26 to 36, inclusive
All German Silver thinner than No. 36 is Platers, at 50c ₩ ℔ additional.
German Silver Scrap one-half less than net price of 12 in. Market Metal. German Silver Turnings, Filings and Chips, half the price of Scrap.

BRASS AND COPPER WIRE.

	High Brass.	Low Brass.	Copper.
No. 0 to 10	.26	.30	.32
No. 11	.31	.35	.41
No. 22	.39	.46	.12
No. 23	.33	.37	.43
No. 24	.35	.40	.46
No. 25	.38	.42	.48
No. 26	.40	.44	.50
No. 27	.43	.47	.53
No. 28	.47	.51	.58
No. 29	.50	.54	.61
No. 30	.53	.57	.67
No. 31	.57	.61	.73
No. 32	.61	.65	.79
No. 33	.65	.69	.88
No 34	.69	.74	.98

Spring Wire 2c ₩ ℔ advance.
Flat, Square and Half Round Wire 3c ₩ ℔ advance on Round Wire.
Fancy Wire not less than 10c ₩ ℔ advance of Round Wire.
Brass Rods, No. 8 and larger not less than 2 feet lengths, 33c.
Wire straightened and cut, smaller than No. 8, and not less than 2 feet lengths, 38c.
Wire and Rods less than 2 feet lengths, special rates.
Twelve cents per ℔ extra for spooling on 1 ℔ spools.

MISCELLANEOUS.
Common Plain Brass Pail Ears $0.36
Brass Door Rail ..... .38

SCRAP.—net.
High Brass Scrap 11c
Low " 13c
Gilding 15c
Turnings, Filings and Chips half the price of Scrap.
Terms—Net cash. Interest to be added after thirty days.

TUBING.—dis 10 % ₩ ℔
Plain to No. 20 inclusive, above ¼ in. to 3 in. $0.38
" above 3 in. ..... .48
Nos. 21, 22, 23, two cents advance on List for each Number.
Nos. 24, 25, 26, four cents advance on List for each Number.
Above No. 26, special rates.
Plain, ¼ inch ..... .65
" 3-16 " 1.05
" ⅛ " 1.55
All Mandrel Drawn Tubes, 5 cents advance on List Prices.
Fancy Tubing to No. 20 ..... 45c
English, Scotch and Extra Patterns Fancy Tubing to No. 20 ..... .50
Tubing Sawed or Cut 2 to 4 feet long, 2 cents advance on List.
Add to 2 cents ½ cent for each additional cutting under 2 feet.
All Mandrel Drawn Tubes under ¾ in., 25 cents per pound advance.

ZINC TUBING.—net.
Plain ..... .22
Fancy ..... .28
Scotch and Extra Patterns ..... .31

GERMAN SILVER TUBING.—dis 10 %
4 Per cent. ..... .75
6 " ..... .85
9 " 1.00
12 " 1.15
15 " 1.20
16 " 1.35
18 " 1.45
20 " 1.55

STEEL.—DUTY: Bars, Ingots, Sheets and Coils, valued at 7 cents ₩ ℔., or under, 2¼¼ cents; over, 7 cents, and not above 11, 3 cents ₩ ℔; over 11, 3½ cents ₩ ℔, and 10 % ad val. Railway Bars, 1¼ cents ₩ ℔. Railway Bars, in part Steel, 1 cent ₩ ℔. Provided, that Metal cemented, cast or made from Iron by the Bessemer or pneumatic process, of whatever form or description, shall be classed as

American Cast Steel.
Tool 15c
Spring 7c
Homogeneous 12½c
Boiler Plate 8c
Tire 6½c
Machinery (round and square) 9c
File 5c
Sheet ..... 11 @ 16c
Saw Plate, mill and mulay ..... 14 @ 16½c
" gang and X cut ..... 13 @ 14c
" circular as to size ..... 18 @ 30c

Chrome Steel.
Tool ..... ₩ ℔ 14 @ 15c
Tool, extra fine ..... ₩ ℔ 40 @ 75c
Spring ..... ₩ ℔ 8 @ 9c
Machinery ..... ₩ ℔ 8 @ 10c
Gun or Homogeneous ..... ₩ ℔ 12 @ 16c

English Steel.—Payable in gold, net.
" Best Cast ..... ₩ ℔ 15½c
" Extra Cast ..... ₩ ℔ 16½c
" Round Machinery, Cast ..... ₩ ℔ 10c
" Swaged, Cast ..... ₩ ℔ 18c
" Best Double Shear ..... ₩ ℔ 15½c
" Blister, 1st quality ..... ₩ ℔ 13c
German Steel, Best ..... ₩ ℔ 11c
" 2d quality ..... ₩ ℔ 10c
" 3d quality ..... ₩ ℔ 9c
Sheet Cast Steel, 1st quality ..... ₩ ℔ 15½c
" " 2d quality ..... ₩ ℔ 14½c
" " 3d quality ..... ₩ ℔ 12½c

ANTIMONY ..... 13¾ to 14c
LEAD.—DUTY: Pig $2 ₩ 100 ℔s; old Lead, 1½c ₩ ℔
Pipe and Sheet, 2½c ₩ ℔.
American ..... 4¼ @ 4½c
Bar ..... 5c. dis 10 %
Pipe ..... 5c. dis 10 %
Tin Lined Pipe ..... 12c, dis 10 %
Sheet ..... 5½c, dis 10 %
Shot ..... Drop 6½c, Buck, 7½c, dis 10 %

BABBITT METAL.
N. P. U ..... ₩ ℔ 6 @ 7c
A 20c: B, 16c: C, 12c: D, 10c ₩ ℔.
TIN.—DUTY: Plates, Sheets, Tagger and Terne, 1.12 ₩ ℔; Electro-galvanized Plates, 2c ₩ ℔; Manufactures of, not enumerated, 35 per cent. ad. val. Bars, Block and Pigs free. Banca, subject to duty of 10 per cent.
Banca ..... ₩ ℔ 20c
Straits ..... ₩ ℔ 18 @ 19 currency
English ..... ₩ ℔ 17 @ 18 currency

TIN PLATES, CURRENCY PRICES
I C 10x14, 12x12, 14x20 } Prime Charcoal ..... $6.00 @ 6.25
I X 10x14, 12x12, 14x20 } Prime Charcoal ..... 8.00 @ 8.25
D C 12½x17 " ..... 4.50 @ 5 75
D X 12½x17 " ..... 7.50 @ 7.75
For each additional X add 2.00

COKE TIN PLATE.

	Best.	2d quality.	Ordinary.
I C 10x14 } I C 12x12 } I C 14x20 }	$5.75	5.50	5.25

TERNE PLATE.

	Prime Char.	2d qual.	Coke.
I C 14x20	$5.50	5.25	5.00 @ 5.12½
I X 14x20	@ 7.50	....	....
I C 20x28	11.00	11.00 @ 11.25	10.00 @ 10.50
I X 20x28	@ 13.00	....	....
I C 20x200	@ 17.50	....	....
I C 14x20 M. F. Brand	....	....	$7.25

SOLDER ..... No. 1, 19½ @ 21c No. 2, 18½ @ 19½c
SPELTER—DUTY: In Pigs, Bars and Plates, $1 ₩ 100 ℔s.
American, cash ..... 5¾ @ 6¼c
Bergen Port from LehighOre ..... 90, gold
Lehigh, on spot 10c
ZINC.—DUTY: Pig or Block, 1.50 ₩ 100 ℔s. Sheet, 2½c ₩ ℔.
Sheet, Cask 5¾c
" Open 6¼c

Paper Stock, Old Metals, &c

(Dealer's Selling Price.)

Canvas linen	4	@
" cotton, No. 1	4	@
" " No. 2		@ 2
White linen rags, No. 1	4	@
" " No. 2	2½	@
Seconds	1½	@ 1¾
Mixed woolens	2½	@ 3¼
Soft woolens	8½	@
Gunny bagging	3½	@
Jute Butts	3	3½
Kentucky bagging	5	@
Waste paper and scraps		@ ¾
Rope cuttings	1½	@ 3
Kentucky bale rope	4	@ 4½
Grass rope		@ 2¾
Tarred shaking	2	@
White collar cuttings, all paper	7	@
" " " muslin lined	5	@
" " Envelope	7	@
Hard White Shavings, No. 1	4	@
Soft " " No. 1	3½	@
White Shavings, No. 2	3¼	@
Mixed Shavings, part white	2½	@
Imperfections, No. 2, best folded sheets	3¼	@
" " No. 1, Heavy Stock	3½	@
Book Stock		@ 3¼
" Heavy	2¾	@
" " Light	1½	@
Newspaper Stock	1¾	@ 1¾
Prints	1½	@ 2
Pure Manilas	2¾	@ 2¾
Bogus Manilas and Hardwares	1	@
Commons	⅝	@
Binders' Board Cuttings	1	@ 1¼
Straw Board Cuttings	¾	@
Woolen Tailor Clips	1¾	@ 1¾
Satinet "	2	@ 2¼

Old Metal.

Copper, heavy	15	@
Copper Bottoms		@ 13½
Yellow Metal	13	@
Brass, light	9	@
" heavy	11	@
Heavy Composition	12½	@
Old Lead, solid		@ 3½
Tea Lead		@ 2¾
Zinc		@ 3¼
Pewter, No 1	11	@
" No. 2	9	@
Wrought Iron	per ton	$17.00
Machinery Iron	per ton	13 00
Light Iron	per ton	10.00
Stove Plate	per ton	10.00
Grate Bars	per ton	4.00

Paints, Oils, &c.

Paints.
Black Lamp, Coach Painters ..... ₩ ℔ 20c
" " Ordinary 6c
" Ivory Drop, fair ..... 12 @ 14c
" " best 22c
Black Paint, in oil ..... kegs, 8c asst'd cans, 11c
Blue, Prussian, fair to best ..... @ 14c
" " in oil ..... @ 18c
Blue Chinese dry ..... 8@
" Ultramarine ..... 18 @ 20c
Brown, Spanish 1½c
" Van Dyke ..... 10@12c
Carmine, 40 ..... combination price
Green, Chrome ..... 15 @ 23c
" " in oil ..... 14 @ 18 @ 24c
" Paris ..... good 25c; best, 30c
" " in oil ..... " 30c; " 44c
Iron Paint, Bright Red ..... ₩ ℔ 2½c
" Red ..... ₩ ℔ 2c
" Brown ..... ₩ ℔ 1½c
" Purple ..... ₩ ℔ 3c
" Ground in Oil, Bright Red ..... ₩ ℔ 5½c
" " " Red ..... ₩ ℔ 5c
" " " Brown ..... ₩ ℔ 4½c
" " " Purple ..... ₩ ℔ 6c
Mineral Paints ..... 1¼ @ 4c
Orange Mineral 12c
Red Lead, American 7½c
" English ..... 9½c gold
" Venetian (N. C.) dry ..... $1.70 @ $1.75
" " in oil ..... asst'd cans, 11c; kegs, 8c
" Indian dry ..... 9 @ 12c
Rose Pink ..... 10 @ 13c
Sienna, American, Raw 4c
" Burnt 4½c
" " in oil ..... 10 @ 16 @ 20c
" Raw " ..... 11 @ 15 @ 25c
Umber, Burnt ..... 4 @ 8c
" Raw " in oil ..... 9 @ 12 @ 16c
" Raw ..... 3½ @ 7½c
" " in oil ..... 10 @ 16 @ 18c
Vermillion, Chinese ..... 90c, gold
" English ..... 60c, gold
" Trieste ..... 1.10, gold
" American, Common 18c
White Lead, American, pure dry 8c
" " in oil 8c
White, Paris, English, prime ..... in bbls. 2 @ 2½c
Yellow Ochre, French $1.75
" " " in oil ..... asst'd cans, 11c; kegs, 8c
" " Vermont ..... in casks 1½c
Yellow Chrome ..... 17 @ 27c
" " in oil ..... 14 @ 18 @ 25c
Zinc White, American No. 1, dry 8½c
" " No. 2, in oil 11c
" French (Paris) 11c
" " in oil ..... 13½ @ 11½c

Oils.
Linseed, Raw, in casks and bbls ..... ₩ gal. 60c & 62c
" Boiled. " " " 65c & 67c
Bleached Whale ..... ₩ gal. 53c
" Sperm ..... ₩ gal. $1.00
" Elephant 65c
Signal 45c
Prime Lard 51c
No. 1 ..... 48c
West Virginia ..... 18c @ 25c
Drilling 45c
Empire Cylinder 64c
Miners' Oil ..... 35 to 45c
Fish Oil, pressed 33c
Neatsfoot 70c
Tallow 8c
Machinery 40c
Engine 60c

Sundries.
Asph altum 6c
Benzine ..... ₩ gal, 16c
Chalk ..... ½c
" Block ..... ¾c
Dryer, Patent, Am'n ..... ass't cans, 10½c; keg, 9c
Frostings 50c
Glue, White ..... 35 @ 44c
" Sheet 20c
Glaziers' Points, Zinc 2c
Gum, Copal 45c
" Damar 25c
" Shellac, English 30c
" " dark 25c

Steel.

R. H. WOLFF & CO.,

IMPORTERS OF

IRON AND STEEL.

Sole Agents for the Sale of the Celebrated

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CAST STEEL WIRE for all purposes.

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Cast Steel Hammers and Sledges. Also, "M. & G." Anvils and Vises.

{WARRANTED CAST STEEL, especially adapted for DIES and TURNING TOOLS, DRILLS, COLD CHISELS, PUNCHES and all kinds of MACHINISTS' TOOLS.
{Celebrated Improved Mild Centre Cast Steel, for Taps, Reamers, and Milling Tools, warranted not to crack in hardening Taps of any size.
Swede Spring Steel, especially adapted to Locomotive and Railway Car Springs.
English Spring and Plow Plate Steel.

Sheet, Cast Steel, Shear, German, Round Machinery, Hammer, Fork and Shovel Steel.

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TOOL STEEL.

Polished, Compressed Drill Rods and Wire,

Warranted equal to any imported in *quality, finish and accuracy.*

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Only single Ring in the market that closes on the outside of the nose. No sharp points in the nose to keep it sore.

Ringers, 75c. Rings, 40c. 100. Holders, 75c. Huskers, 15c.

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ESTABLISHED 1845.

The annexed cut shows one of the many styles of Coffee Mills of our manufacture, especially adapted to Grocers' use and all retailers of coffee. They are highly ornamental, and workmanship of the very best. We make more than 30 styles.

ALSO LANE'S PORTABLE COFFEE ROASTER

Will roast 30 to 40 lbs. at once, and can be used as a stove at other times. Send for descriptive list to Manufacturers.

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Also sold by leading wholesale houses.

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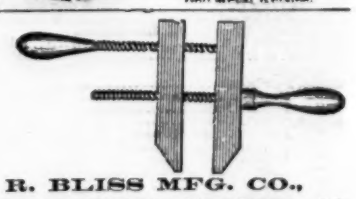

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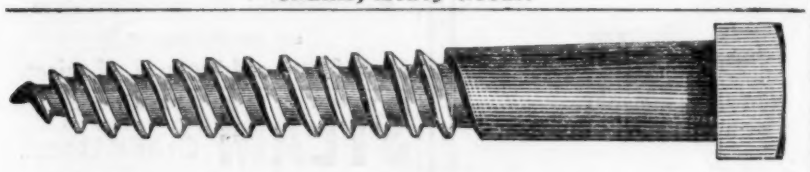

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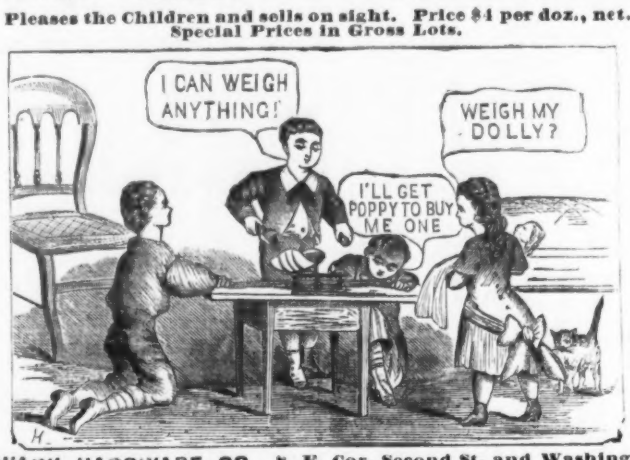

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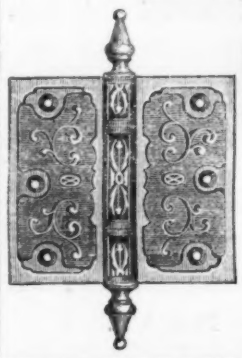

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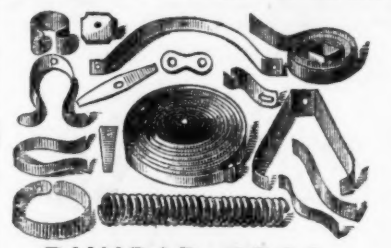

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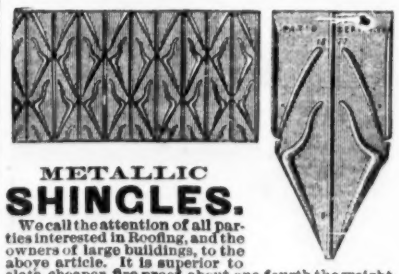

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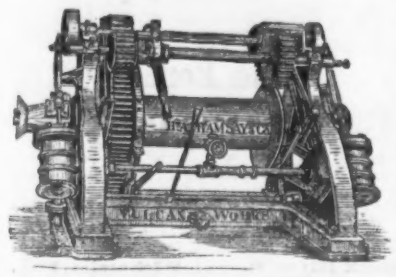

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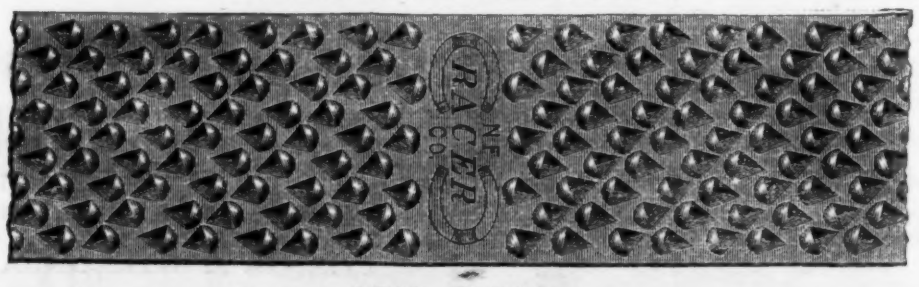

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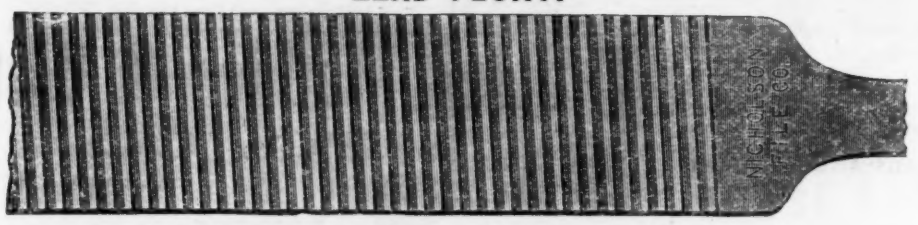

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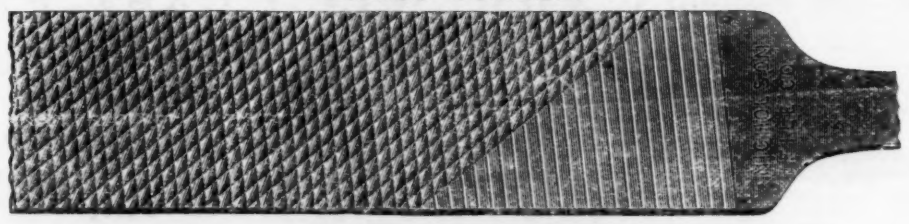

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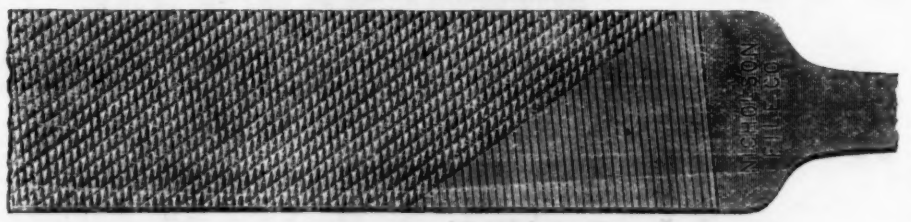

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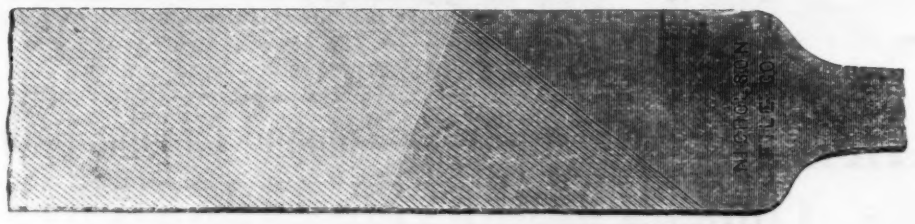

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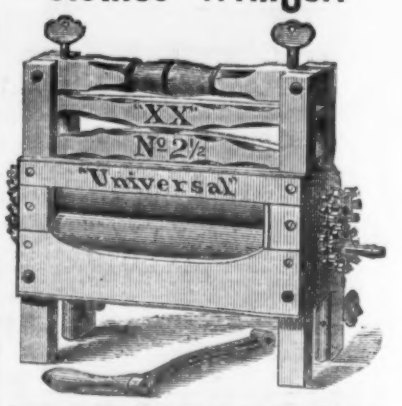

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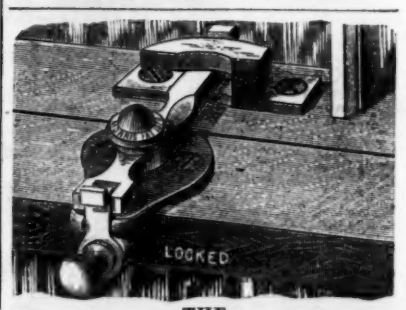

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" without Augers....." 5 50 dis 40&10%
Angular, with Augers....." 11 00 dis 40&10%
" without Augers....." 7 00 dis 40&10%

Bolts.—Eastern Carriage Bolts.....dis 75&2½—cash
Philadelphia " " .....dis 60&10 @ 60&10%
Stanley, Wrought Shutter.....dis 50%

Braces.—Barber's.....dis 40&5%
Fackus.....dis 50 @ 50&10%
Snofgard.....dis 50%
American Ball.....dis 25&10%

Butts.—Cast Fast Joint, Narrow.....dis 60&10%
" " Broad.....dis 65&10%
Cast Loose Joint, Narrow.....dis 70&10%
" " Broad.....70c 70%
" Acorn, Loose Pin.....dis 65&10%
" Acorn " Jap'd.....dis 67½&10%
Mayer's Loose Joint.....dis 70&10%
Wrought Loose Pin.....dis 40&10%
" Table Hinges and Back Flaps.....dis 45&10%
" Narrow, Fast.....dis 40&10%
" Loose Joint.....dis 40&10%

Blind Butts.
Parker.....dis 60 @ 60&10%
Clark.....dis 60%
Shepard.....dis 60%
Lull & Porter.....dis 66⅔&10%
Huffer's.....dis 33⅓ @ 33⅓&10%

Chains.—German Halter and Coil.....dis 30&5% gold
Galvanized Pump.....₱ ℔ 10½c net
Best Proof Coil Chain—(English).

₱ ℔.....	11¼	8½	7¾	7¼	8¼	7c gold
	3-16	¼	5-16	⅜	7-16	½ in.

Chisels.—Socket Framing.....dis 65, 5&10%
Socket Firmer.....dis 65, 5&10%
Butcher's.....$5 00 to £ gold

Coasters.—Bed.....dis 50&10%
Plate.....dis 50&10%

Coffee Mills.—Box and Side.....dis 25%
Enterprise.....dis 20%

Cutlery.—Walden Pocket.....dis 30 @ 35%
Landers', Frary & Clark, J. Russell & Co., Lamson & Goodnow Mfg. Co. and Meriden Cutlery Co., Manufacturers' prices net.

Drawing Knives.—
Hart Mfg Co.'s.....dis 65, 5&10%
Adjustable Handle.....dis 20%

Fry Pans.

Tinned.....								dis 50&10 @ 60%
₱ doz..$3 50	4 00	4 50	5 00	5 50	6 50	7 50	9 00	10 00
No..... 0	1	2	3	4	5	6	7	
Burnished.....								dis 50&10 @ 60%
₱ doz..$4 00	3 75	4 25	4 75	5 00	6 00	7 00	8 00	9 00
No..... 0	1	2	3	4	5	6	7	8

Files.
Nicholson.....dis 35%
Disston.....dis 35
Butcher.....$1 50 £ gold
Spencer.....$4 50 @ 4 75 £ gold

Fluting Machines.
Imperial—4¼ in. roll.....each $2 50 net
" —6 in. roll....." 3 00 net
Eagle—3½ in. roll.....per doz., $30 00 }
" —4¼ in. roll.....Each 40 00 } dis 45%
Crown—1¼ in. roll.....Each 4 00 }
" —6 in. roll....." 4 75
" —8 in. roll....." 7 25
Geneva Fluter.....per doz. 15 00 net
Favorite com. Fluter & Bad-Iron..₱ doz $30 dis 25&10%

Hammers.
Yerkes & Plumb's.....dis 25 @ 30%
Hammond & Son's.....dis 25 @ 30%

Hatchets.
Yerkes & Plumb.....dis 25 @ 30%
Hammond.....dis 25 @ 30%
Hunt.....dis 25%

Hinges.
Strap and T.....dis 60 @ 60&5%

Horse Nails.

	Nos. 5	6	7	8	9	10
Ansable.....	30	27	25	24	23	22
" Polished & Pt'd and Blued and Pointed	31	28	26	25	24	23
Globe.....Net list	26	23	21	20	19	18
Clinton.....	22	20	19	18	17	
" Polished and Pointed.....	23	21	20	19	18	
Southern, all sizes.....						₱ ℔ 14c. net

Discount on Ansable and Clinton, 40%; Globe, net.

Locks and Knobs.
Branford.....new list, dis 60&10&2% cash
Gaylord Cabinet.....dis 25&2% cash
United States Lock Co.....dis 35%
American Padlocks.....dis 33⅓, 5&2% cash
Scandinavian Pad Locks.

₱ doz...$5 00	5 50	6 50	7 50	8 50	10 00	12 50 } dis 30%
No..... 57	58	59	60	61	62	63 }
₱ doz.....			$18 00	20 00	35 00 } dis 30%
No.....			64	65	66 }	

Lanterns.—
Square Candle and Oil.....₱ doz. $2 75 @ 3 00
Tubular.....No. 0, $10 50; No. 1, 12 50 ₱ doz. net
Guards, 50 cents extra per doz. nt.

Mattocks.—
Long and Short Cutter.....₱ doz. $9 00 @ 9 50 net
Pennsylvania Pattern....." 9 50 @ 10 00 net

Molasses Gates.
Enterprise Mfg. Co.'s Measuring Faucets.....dis 20%
Stebbins' Gates.....dis 62½&10%
Lincoln's " .....dis 62½&10%
Landers, Frary & Clark's Petroleum.....dis 20&10%
Brass Liquor Cocks.....dis 5%
Cork Lined " .....dis 65 @ 65&10%

Nail Cutters.—Dixon's.....dis 25 @ 30%
Woodruff.....dis 25 @ 30%
Stowe.....dis 25 @ 30%
Hale's.....new list, dis 50&2%
American.....dis 25%
Stuffers.....dis 25 @ 30%
Enterprise Stuffers.....dis 20%

Pincers.—Sandusky.....dis 35%
Ogonts.....dis 40&10%
Bailey.....dis 25&10%

Pipe Tools.—Sandusky.....dis 10&10%

Plumb and Levels.
Butcher's.....gold £, $5 50
Stanley's Adjustable.....dis 60&10%
" Non-Adjustable.....dis 60&10%

Picks.—Philadelphia.....dis 50%
Hunt's.....dis 25%

Pumps.—Elefors.....$7 00, dis 30&10%

Rules.—Stanley Boxwood.....dis 40&10%
Stanley Ivory.....dis 50&10%

Steelyards.—Hart's Pattern.....dis 60&10%

₱ doz.....	$14 50	17 75	21 00	26 50	$31 50	$35 50
Lbs.....	50	100	150	300	400	600
American Pattern.....						dis 25 @ 25&10%
₱ doz.....	$5 50	7 00	9 00	10 00	11 00	12 00
Lbs.....	50	100	150	200	250	300
English Pattern.....						dis 25 @ 25%
₱ doz.....	$7 00	8 67	10 67	12 67	14 67	16 67
Lbs.....	50	100	150	200	250	300

Squares.—
Steel and Iron.....dis 30%; full case, dis 50&10%
Try Squares, Stanley.....dis 25&10%
Disston's Try Squares.....dis 45%

Scythes.—Golden Clipper, Damascus Blede, Boxed and Sharpened.....₱ doz. $9 00 net
Clipper No. 10, Bronzed Blade Boxed and Sharpened.....* doz. $8 50 net
Clipper No. 5, Painted Red, Boxed and Sharpened.....₱ doz $8 25 net

Saws.—Disston's Hand, Panel and Rip.....dis 20%
Disston's Circular.....dis 30%
Cross-Cut No. 2, Plain Tooth..₱ ft., 45c. net
" " Patent Tooth....₱ ft., 35c. net
" " Champion Tooth....₱ ft., 25c. net

Shovels and Spades.
Rowland.....dis 50&5%
Oliver Ames & Sons, new list...dis 22½%
Not stamped "Ames".....dis 37½%

Sad Irons.—4 to 10 lbs.....₱ ℔., 2½ @ 2¾c
Mrs. Potts' Parent.....dis 30 @ 40%

Stone.—Arkansas Oil Stone.....₱ ℔ $2 00 net
Washita Extra....." 35c net
" No. 1....." 30c net
" " 2....." 25c net
" Slips....." 60c net
" Axe....." 25c net
Turkey Oil Stone No. 1....." 16½c net
" " " 2....." 10c net
" Axe Stone....." 25c net
Hindostan Oil Stone No 1.....₱ ℔ 4 @ 4½c net
" Axe Stone....." 5 @ 5½c net

Screws.
Flat Head Iron.....dis 65%
" " Brass.....dis 50%
Round Head Brass.....dis 50%
" " Iron.....dis 65%

Spoons.—
Plated.....dis 40 @ 40&5%
German Silver.....dis 30&5%
Britannia, Boardmans.....dis 50&10%
" Parkers.....dis 50&10%
Tinned.....dis 15 @ 20%
" by case.....dis 20%

Springs.—Torrey.....₱ doz $2 00 @ 2 10 net
Philadelphia.....8 in., $3 00; 8 in., $4 00 ₱ doz. dis 25%
Chatfield.....No. ', $3 50; 2, $4 00; 3, $6 00 ₱ doz. net
Gem Coil No. 1, Large Jap'd.....₱ doz ($2 50)
" No. 2, Medium Jap'd....." 2 50 } d's
" " No. 3, Small " ....." 2 00 }

Stocks and Dies......dis 10&5%

Stove Polish.—Gem.....₱ gross, $4 50, dis 5%
Dixon....." $6 00, dis 5%
Onyx....." $4 00 @ 4 25 net

Tacks, Brads, &c.—New List.....dis 5&10%
Shoe Nails—
4-8 and larger, 8c; 3¼-8, 9½c ₱ ℔ New list, net
Double Pointed Tacks.....dis 40&5%

Traps.
Genuine Oneida—Newhouse.....dis 30%
Im. Oneida—Newhouse list (1st qual.).....dis 60%

Vises.—Solid Box, Trenton.....₱ ℔ 11¼ @ 12½c net

Wrenches.—
Girard (Coe's Pattern).....dis 50&10%, case 50, 10&5%
Agricultural—
₱ doz 10 in., $3 60; 12 in., $5 40 net; case dis 5%
Coes' Genuine.....dis 5&10%
" Pat. Wrot Bar .....dis 60&10%
" " Mall " .....dis 75&10%
Taft's " Wrot " .....dis 75 @ 75&10%
Phila. Tool Co., Duplex.....dis 20%

Wire.—
Bright or Ann'd, No. 6 to 18.....dis 87½%
" No. 19 to 26.....dis 60%
" No. 27 to 36.....dis 62½%
Coppered 6 to 18.....dis 62½%
Tinned Broom Wire.....dis 47½%
Galvanized, No. 7 to 18.....Market list, dis 50%

Wringers.—Novelty No. 10.....₱ doz. $60 00 net
Novelty No. 3....." 63 00 net
Universal, No. 2½....." 60 00 net
" No 2....." 42 00 net

PITTSBURGH.

Merchant Iron.

Flat Bar.
1½ to 4x⅜ to 1 in.....1.80c
4½ to 6x¼ to 1 in.....1.90c
1⅜ to 6x1¼ to 1¾ in.....2.20c

Rounds and Squares.
¼ to 1⅜ in.....1.80c
2 to 2¾ in.....2c
2¾ to 3¼ in.....2.40c
3¼ to 4 in.....2.80c
⅝ to ⅞ in.....1.90c

Horse Shoe Bar—all sizes.....2.80c

Heavy Bands.
3¼ to 6x1¼ and 5-16 in. 2c
1⅜ to 3¼x1¼ & 5-16 in. 2c

Light Bands.
3 to 6x1¼ to 3-16 in.....2.10c
1¼ to 2¾x1¼ to 3-16 in..2.30c
Same sizes X No. 11 and No. 12 2-10c. extra.

Hoop Iron.
⅝ & 9-16, Nos. 13 to 16..4.50c
¾&11-16, Nos. 13 to 16.. 4c
⅞&13-16, Nos. 13 to 16..3.50c
1 & 1⅛, Nos. 13 to 15..3.80c
1¼ to 2, Nos. 13 to 15..2.70c
The prices under Hoop Iron do not apply to Cotton Ties.
1-10c ₱ ℔ extra for each gauge lighter.

Oval Iron.
⅞ to 1¼ in.....2.30c
⅛ to ¾ in.....2.40c

Half Oval & Half Round
⅞ to 1¼ in.....2.50c
⅛ to ¾ in.....3c

Sheet Iron.

	Com'n.	Chare'l
No. 10 to 14..2.60c		4.10c
No. 15 to 17..2.80c		4.30c
No. 18 to 21..3.10c		4.60c

All Sheets, No. 18 and lighter, over 30 in. wide, not less than 2-10c. extra.

Wood's Patent Planished Sheet.
1st quality (A).....10½c | 2d quality (B).....9½c

Plate Iron—3-16 to ½ in. thick.....2.60c

Galvanized Iron-Juniata.

Nos. 14 to 20.....12c	No. 27.....15c
Nos. 21 to 24.....13c	No. 28.....16c
Nos. 25 and 26.....14c	No. 29.....15c

Common and imperfect Juniata, 45 to 50% off. Discount, 30 to 40%.

Roofing Iron, Corrugated or Crimped.

Galvanized Common.	Black.
No. 20.....7c, net cash	No. 20.....4c
No. 21 to 24..7½c, "	Nos. 21 to 24.....4½c

Bridge Iron.
Carnegie Bros. & Co.'s list.
Beams and Channels.
Solid Wrought Iron Beams, 3 to 10½ in. x 50 ft..₱ ℔ 3 c
" " " " 12 in. by 25 ft..." 3
" " " " 15 in. by 25 ft..." 3½c
Deck Beams, 7 to 9 in. by 30 ft.....3 c
Channel Bars, 1¼ to 10 in. by 30 ft.....3 c
" " 12 in by 30 ft.....3½c

Tee Iron.
1 in. x 1 in. to 5 in. x 3 in.....₱ ℔ 2.90

Angle Iron.
Equal Sided, 1x1 to 1¾x1¾ in.....₱ ℔ 2.5c
" 2x2 to 4x4.....2.6c
Unequal Sided, 2x1¾ to 5x4.....2.6c
Square Root Angles, 2x2 to 3½x3½.....2.6c
Star Iron, 1½x1½ to 4x4.....2.7c
Sash Iron, 1¼x1¼x3-16.....3.20c
Miscellaneous Shapes, various shapes...₱ ℔, 2.6 to 3.5c

Nails.
Fence and Brads.
10d to 60d.....$2.50 | 4d and 5d.....$3.25
8d and 9d.....2.75 | 3d.....4.00
6d and 7d.....3.00 | 2d.....4.25

Barrel.

⅝ in.....	6.50	1¼ in.....	4.25
½ "	5.50	1⅛ "	4.00
1 "	5.00	1¼ "	3.75

Lining.
⅝ in.....7.00 | ⅜ in.....8.50
10d.....3.00 | 8d.....3.25
6d and 7d.....3.50
Tobacco Hhd.
Clinch—All sizes.....4.25

Slating.
9d.....3.50 | 3d.....4.25
4d.....3.50 | 2d.....4.50

Finishing.
1 in.....7.50 | 1¼ to 1¾ in.....4.50
1¼ " .....6.50 | 2 in.....4.25
1⅜ " .....4.75 | 2¼ " 4.00
3 " and over.....3.75

Casing and Box.
10d to 30d.....3.25 | 6d.....3.75
8d.....3.50 | 4d.....4.00
3d.....5.00

Fine Bhued.
4d.....4.25 | 3d.....5.50
2d.....6.25

Cut Spikes—All sizes.....3.75

Boat Spikes—All sizes.....3.25
Each half keg 10 cents extra.

TERMS.—Note or acceptance at 60 days; or a discount of 2 per cent. for cash, if remitted within 10 days from date of invoice. An abatement of 10 cents per keg allowed upon orders of 200 kegs or over.

Steel.
Square, Flat and Octagon Tool Steel.
¾ to 2 in.....13c | 7-32 and 4½ 5 in.....16c
5-16 and 2¼ to 3 in.....14c | 3 16 and 3¼ to 6 in.....15c
¼ and 3½ to 4 in.....15c | 5-32 in.....18½c
Single and Double Shear Nailers—Same as Tool.
Knife, Tup, Die, Mill Pick, Drill—Ordinary sizes.....13c

Machinery Steel—Round.
⅜ to 2 in.....7½c | 7-32 and 4½ to 5 in.....12½c
5-16 and 2¼ to 3 in.....8½c | 3-16 and 3¼ to 6 in.....13½c
¼ and 3½ to 4 in.....9½c | 5-32 in.....18½c
Cast Spring Steel.
1 to 4x¾ to ½ in.....6½c | 1¼ to 3x5-32 to 3-16 in...7½c
⅜ to 1½x5-32 to 3-16 in.9½c

Agricultural Steels.
Solid Cast Steel Plow, 4 to 16 by 3-16 to ¾ in.....7c
" Iron Center Plow," 4 to 16x3-16 to ⅜ in.....8c
" Iron Back Plow," 4 to 16x3-16 to ⅜ in.....8½c
Soft Steel Center Plow, 4 to 16x3-16 to ⅜ in.....9c
Landside and Cultivator, C. S., ⅜ in. thick.....9½c
Circular Plow Coulters, 5-32 to ¼ in. thick.....11c
Reaper and Scythe.....13c
Fork and Hoe.....7c
Horse Rake Teeth, tol ength.....8c
Finger Bar.....8½c
Cutter Bars, C. S.....8½c
" German Spring Steel.....7½c
Cornstalk Cutter beveled to length.....8c
Planters' Hoe, C. S.....9c
Hoe, C. S.....7½c

Sheet Steels.
German, 10 to 16 g.....8c | Common C'st, 17 to 20 g.10c
" 17 to 20 g.....11c | Best Cast, 10 to 16 g.....13c
Common C'st, 10 to 16 g. 9c | " " 17 to 20 g.....14c

Rolls and Castings.
Furnace, Floor and Straightening Plates.....1¾ @ 2c
Housings and Castings not otherwise specified.....2½c
Guide Plates.....3 c
Spindles and coupling boxes.....2 @ 2½c
Sand Rolls and Pinions, large size.....2½c
" " small size.....3 c
Pipe Mill Castings.....4 c
Rolling Mill Castings under 50 lbs.....3 c
Spur and Bevel Wheels, large.....3 @ 3½c
" " small.....4 @ 4½c
Pulleys up to 30 inches.....4 c
" over 30 inches.....3½ @ 3½c
Engine Castings, light.....3½c
" " heavy.....3½c

Chilled Rolls.
5 to 7 in. diam., 7 to 20 in. long.....6 c
8 to 15 in. " 8 to 40 in. " .....5 c
15 to 24 in. " 15 to 72 in. " .....4 c
24 to 31 in. " 72 to 108 in. " 4½c

Heavy Hardware.
Bolts, Screws, Nuts, etc.
Lewis, Oliver & Phillips, discount off Standard List.
Carriage & Tire Bolts, ordinary orders 75, & 3% off net
Stove Bolts.....50&5% off net
Elevator Bolts.....30% off net
Machine and Square Head Bolts.....60&10% off net
Coach and Lag Screws.....60&10% off net
Bolt Ends.....60&10% off net
Pat. Hot Pressed Sq. and Hex. Nuts.....8c ₱ ℔ off net
Washers, all made from new band iron..8c ₱ ℔ off net
Nuts and Washers in 25 ℔ boxes, ½c ₱ ℔ ex. Nuts and Washers in lots less than one keg each size, ½c ₱ ℔ ex. Nuts and Washers in 5 ℔ boxes, 1c ₱ ℔ ex.
Strap and T Hinges.....60&12½% off net
Harrow Teeth.....net
Skein Bolts.....net
Cast Iron Washers.....3½c ₱ ℔ net
Fire Shovels and Pokers.....40% off

Wagon Hardware.
Single Trees, Neck Yokes and Double Trees, made from best selected hickory, and ironed complete, in the most approved patterns.
No. 1 Southern Plow Single Tree, Ironed complete, Irons all Wrought.....each, 25c net
No. 2 Western Plow Single Tree, Ironed complete, Irons all Wrought.....each, 35c net
No. 3 Wagon Single Tree, Iron complete, Irons all Wrought, except Malleable Ferrule.....each, 50c net
No. 4 Wagon Single Tree, Ironed complete, Irons all Wrought; Improved End Pieces riveted on; one side acts as a wear iron for wheel to rub against.....each, 90c net
Neck Yoke, Ironed complete, Irons all Wrought except End Ferrules, with Wt. Iron Rings.....each, 60c net
Southern Plow Double Tree, Ironed complete, Irons all Wrought.....each, 90c net
Wagon Box Strap Bolts—
For orders of 100 Set, 44&10% dis.

10 in. long by	7-16	at Screw End,	₱ set of	8	bolts..	45c
12 in. "	½	" "	"	8	" ..	55c
10 in. "	9-16	" "	"	8	" ..	65c
12 in. "	9-16	" "	"	8	" ..	70c
14 in. "	9-16	" "	"	8	" ..	80c
10 in. "	⅝	" "	"	8	" ..	80c
12 in. "	⅝	" "	"	8	" ..	80c
14 in. "	⅝	" "	"	8	" ..	90c
16 in. "	⅝	" "	"	8	" ..	1.00
18 in. "	⅝	" "	"	8	" ..	1.10
20 in. "	⅝	" "	"	8	" ..	1.20

90 ₱ set for each additional inch over 14 inches. All lengths made.

Chains, Straight or Twist Link.
Reiter & Morton's List.

5-16.....	7c	⅜.....	6¾c
⅜.....	6c	9-16.....	6¾c
7-16.....	6c	½.....	6c

Net cash, 30 days.

Horse Shoes, Etc.—In 100 keg lots.
Juniata Horse Shoes.....per keg, $3 50
" Mule " ....." 4 50
" "Roadster" pattern....." 3 75
Steel Toe Calks.....per 7½c lb.
Thistlewood & Co.'s Self-Sharpening Horse Shoes.....per keg, $5 25
Thistlewood & Co.'s Self-Sharpening Snow Shoes....." 5 50
Toe Calks.....per lb. 8c

White and Red Lead.
Assorted Kegs (all sizes).....8c
25 ℔ Tin Pails, 100 ℔ Cases.....8¼c
12½ ℔ Tin " 9c
Red Lead.....in kegs, 6¼c; in barrels, 6¼c.
Orange Mineral.....6¼c; " 9 c.
Litharge.....6¼c; " 6¼c.
Dry White Lead.....7¼c; " 7¼c.
White Lead in Oil in lots of less than 500 lbs., ½c additional.
Terms: Note at sixty days, or if paid within 15 days from date of invoice, a discount of 1% per cent. will be allowed, but not otherwise.

Window Glass.
Per Box of 50 Feet.—Discount 75%.

Single Strength.

Size.	AA.	A.	B.	C
6 x 8 to 10 x 15.....	$7 50	$6 75	$6 25	$5 75
11 x 14 to 16 x 24.....	8 50	7 75	7 25	6 75
18 x 22 to 20 x 30.....	10 75	9 75	8 75	7 75
15 x 36 to 24 x 30.....	12 25	10 75	9 00	
26 x 28 to 24 x 36.....	13 00	11 50	9 75	
26 x 36 to 26 x 44.....	14 50	13 25	10 75	
26 x 46 to 30 x 50.....	15 00	14 00	11 25	
30 x 52 to 30 x 54.....				
30 x 56 to 34 x 56.....				
34 x 58 to 34 x 60.....				
36 x 60 to 40 x 60.....				

Double Strength.

6 x 8 to 10 x 15.....	12 00	11 00	10 00	8
11 x 14 to 16 x 24.....	13 75	12 50	11 75	10 50
18 x 22 to 20 x 30.....	17 25	15 75	14 00	
15 x 36 to 24 x 30.....	19 75	17 25	14 50	
26 x 28 to 24 x 36.....	21 00	18 50	15 75	
26 x 36 to 26 x 44.....	23 25	21 25	17 25	
26 x 46 to 30 x 50.....	24 00	22 50	18 00	
30 x 52 to 30 x 54.....	25 75	23 25	19 25	
30 x 56 to 34 x 56.....	27 75	25 00	21 75	
34 x 58 to 34 x 60.....	29 25	27 75	24 00	
36 x 60 to 40 x 60.....	33 25	30 00	27 75	

An additional 10 per cent. will be charged for all glass more than 40 inches wide. All sizes above 52 inches in length and not making more than 80 united inches, will be charged in the 84 united inches bracket.

CHICAGO.

(The Chicago Stamping Co., 10, 12 & 14 Lake St.)
November 12, 1878.

Tin Plate.—

10x14, IC, Ch'l. Good.	$6 25	14x20, IXX. Ch' Best.	10 50
10x14, IC, " Best,	6 50	14x20, IXXX. " "	12 50
10x14 IX, " "	8 50	DC, 100 Plate " "	6 00
12x12, IC. " "	6 00	DX. " "	8 50
12x12, IX, " "	7 00	DXX. " "	10 50
12x12, IX, " "	8 50	DXXX " "	12 50
14x20, IC, " "	6 50	IC, Roofing, " "	6 00
14x20, IX, " "	8 50	IX. " "	8 00
20x28, IC, Charcoal Roofing, Good.....			12 50
20x28, IC, " Best.....			16 50
20x28, IX, "			16 50
10x14, IC, Coke Plates.....			6 00
14x20, IC, "			6 00
10x20, IC, "			9 50

Block Tin—

Large rigs.....	19c	Bars.....	21c
Small.....	20c		

Zinc.—Sheet, 500 to 1000 ℔. Casks.....6¼c
Loose Sheets.....6½c
Slab Zinc or Spelter.....6 c
Copper.—Bottoms.....25c
Sheathing.....28c
Planished.....33c
Boiler lengths.....35c
Ingot.....19c
Bolt.....24c
Brazlers' Sheets.—
30x60, 6 to 7 lbs...₱ ℔ 23c | 30x60, 10 to 12 lbs...₱ ℔ 26c
30x60, 8 to 9 lbs...." 25c | 30x60, 15 to 100 lbs." 24c
Solder.—F. S. & Co.'s make
Best Fine.....14c
No. 1.....13c
Roofing.....11½c
Brazlers or Spelter Solder.....28 @ 29c
Antimony.....16c
Babbit Metal—F. S. & Co.'s.....12c
No. 2.....10c
Sheet Iron.—

	Common.	Smooth Com.	Smooth Charcoal.	Smooth Juniata
No. 24.....	3.10c	3.90c	5¾c	7 c
25 & 26...	3.30c	4.10c	6 c	7¼c
27...	3.50c	4.30c	6¼c	7¼c

Galvanized Iron.—dis 45%

No. 16 to 20.....	12c	No. 27.....	15c
21 to 24.....	13c	28.....	16c
25 & 26.....	14c		

Russia Iron.—
Perfect.....14c | No. 1 Stained.....13½c
In Sheets, 1c. higher.
American Russia.—
A.....10½c | B.....9½c
In sheets, 1c higher.
Lead.—
Pig.....5 c | Lead Pipe, in full coils 8
Bar.....6 c | Lead Pipe, when cut.. 8¼
Wire—bright.....dis 50%
Coppered.....dis 45%
Sheet Lead.....6

J. ALFORD HOUSE,

Bridgeport, Conn.,
MANUFACTURER OF
Scroll Saws,
Trunk Hinges and Hardware of all kinds.

THE BEST HEATERS IN THE WORLD

At the Lowest Prices.

GOLD'S
"HYGEIAN,"
"HEALTH,"
"TUBULAR,"
"PERFECT" and
"ECONOMIST"
HEATERS.

SOLE PROPRIETORS AND MANUFACTURERS,

Guy C. Hotchkiss, Field & Co.

622 to 642 East 14th St., New York.

BRASS CRUCIBLE. BLACK LEAD STROW, WILE & CO. BLACK LEAD CRUCIBLES TRADE. RETORT MARK. PHILA. CRUCIBLE WORKS. STEEL CRUCIBLE.

CRUCIBLES.

FOR MELTING ALL KINDS OF METALS,
And Manufacturers of

Sunny Side Stove Polish.

Lumber Pencils, Foundry Facings and Lubricating Plumbago.

WILE, SIEDEL & CO.,

Nos. 1324, 1326, 1328, 1330, 1332 & 1334 Callowhill St., Phila.

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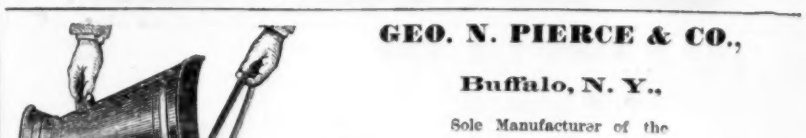
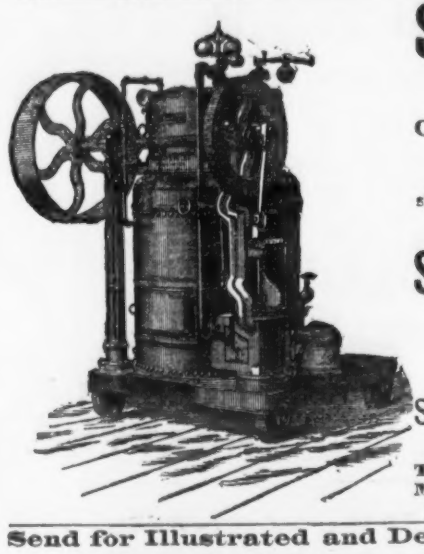
Messrs. HALL & CARPENTER, 709 Market St., Phila.

WM. F. FOREPAUGH, JR. & BROS.
Manufacturers of SUPERIOR OAK TANNED
LEATHER BELTING.
Best Quality Lace and Strap Leather on Hand, Rivets, Belt Hooks, Dubbing, &c.
N. W. Cor. Randolph and Jefferson Sts., PHILADELPHIA.
☞ All Belts Warranted. Orders by Post immediately attended to.

Morse Twist Drill and Machine Co.,

NEW BEDFORD, MASS., Sole Manufacturers of
Morse Patent Straight-Lip Increase Twist Drill,
Beach's Patent Self-Centering Chuck, Solid and Shell Reamers.
BIT STOCK DRILLS,
Drills for Coes, Worcester, Hunter and other Hand Drill Presses. Beach's Patent Self-Centering Chucks, Center and Adjustable Drill Chucks, Solid and Shell Reamers. Drill Grinding Machines. Taper Reamers, Milling Cutters and Special tools to order.
All Tools exact to Whitworth Standard Gauges.
GEO. R. STETSON, Supt. EDWARD S. TABER, Treas.





SHAPLEY ENGINE.

Patented - - - Feb. 10, 1874.
Reissued June 22, 1875.

Compact, Practical, Durable and Economical.

Acknowledged to be the best in use. This boiler stands unrivaled.

MANUFACTURED BY

SHAPLEY & WELLS,

Binghamton Iron Works,
Binghamton, N. Y.

MANUFACTURERS OF

Stationary Engines and Boilers.

Also **Machinery for Mills** of all kinds and **Tanneries.** Also their celebrated **Bark Mills,** acknowledged to be the best.
Send for reduced price list circular.

Send for Illustrated and Descriptive Circular of the

FIRMENICH PATENT

SAFETY STEAM BOILER.

The Boiler that made the Best, Dryest, Hottest and Greatest Quantity of Steam per pound of coal at the Centennial Exhibition, and received the Highest Award therefor,

A DIPLOMA AND MEDAL.

AND HAS THE FOLLOWING SUPERIOR ADVANTAGES:

No cleaning of flues, no hard firing caused thereby, and no corrosion caused by the accumulation of soot. Safety from disastrous explosion. The Utmost Durability. Economy, being the most economical boiler in the world. No foaming or priming; entirely dry steam.

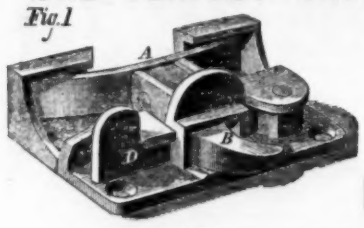
J. G. & F. FIRMENICH,

OFFICE,

No. 13 Mortimer Street. - - BUFFALO, N. Y.

THE PERFECT SASH TIGHTENER AND LOCK.

Fig. 1



Manufactured entirely from Malleable Iron, Burglar Proof, Anti-Rattling, Draws Sash to Exact Center. No Springs to Get out of Order.

The Best in the Market.

METALLIC CLOTHES PIN,

For either Wire or Rope Line,

Will securely hold any article, from a silk handkerchief to a carpet. No article can be blown away. Does not soil the clothing. Manufactured by

CLARK & SMITH, Patentees, Chester, Orange Co., N. Y.
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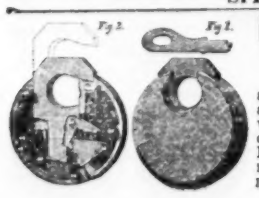
Who keep a general assortment on hand for the country trade. **Jowett's Horse Rasps,** 14, 15 and 16 inch, **Maharay's $10 Tire Shrinker, Heller's Rasps.** Send for Circular.

SPECIAL DISCOUNTS TO JOBBERS.



D. K. MILLER LOCK CO.,

712 Cherry St., Philadelphia.

Greatly improved. Prices reduced. As now made it is the best and most economical Pad Lock for all uses extant. Appreciated by all who use them. For simplicity, compactness, durability, convenience and security it has no equal. Springs now made from the celebrated Phosphor Bronze. We make these Locks with Master Keys when so ordered. Largely used by the U. S. Government, Railroads, Corporations, etc., etc. Samples of 2¼ in. size sent per mail on receipt of one dollar.

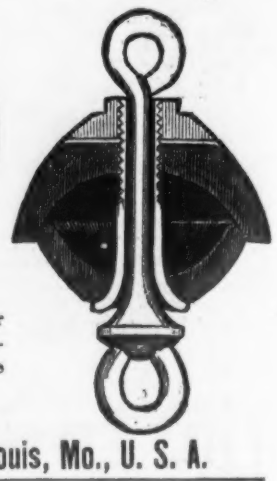
L. M. RUMSEY & CO.,

SOLE OWNERS AND MANUFACTURERS OF

Witherell's and Churchill's Patent

RUBBER BUCKETS, PUMP CHAIN AND FIXTURES

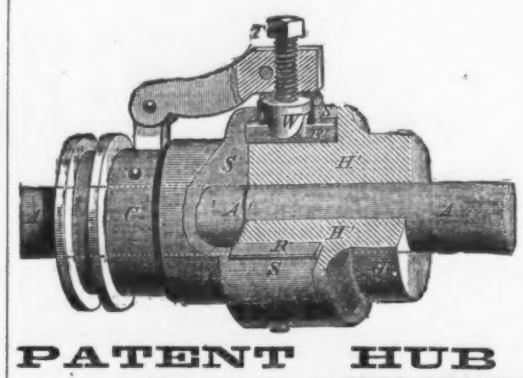
For Chain Pumps.

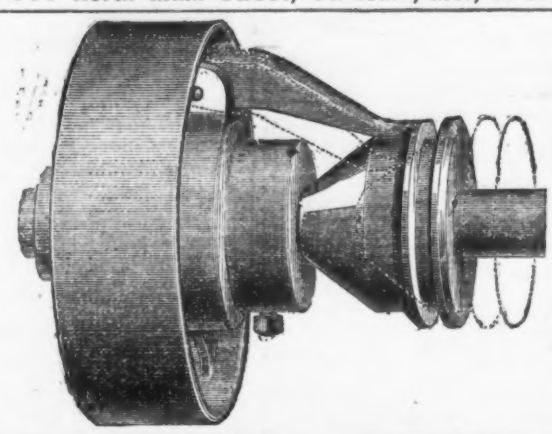


These Patents cover the use of the Rubber, the use of the Nut and Bolt for expanding, the use of the Tube and Valve for draining. All others are infringements, and manufacturers and dealers in infringing Buckets will be prosecuted to the full extent of the law.

For Rubber Buckets, Chain Tubing, Curbs and Fixtures, address

L. M. RUMSEY & CO., 811 North Main Street, St. Louis, Mo., U. S. A.





HUB FRICTION CLUTCH.

James Smith & Co., Mfg. Agents

PATENT HUB FRICTION CLUTCH.

Manufactured by the **HUB FRICTION CLUTCH CO., Limited, Philadelphia.**

We claim for this device the following advantages for a perfect clutch, it having been adopted by several of the leading manufacturers of machinery and machinists' tools: It works easily but effectively. It works instantly and without noise. It is very durable, and is extremely simple and cheap, and has proven itself to be the best clutch in the market. Special arrangements can be made with leading manufacturers for the adoption of this clutch for their own tools. This clutch can and will be sold for less money than any other clutch in the market.

For sale by GEO. V. CRESSON, Philadelphia; MORTON, REED & Co., Baltimore.

JAMES SMITH & CO., Mfg. Agents, 137 Market Street, Philadelphia.

H. S. MANNING & CO., NEW YORK AGENTS, 111 Liberty Street.

THE EAGLE ANVIL!! WARRANTED!!

(ESTABLISHED) 1843.

These Anvils are *superior* to the best English, or other Anvils, on account of the peculiar process of their manufacture (invented and used only by this concern), and from the quality of the materials employed.

The best English Anvils become hollowing on the face by continued hammering in use, on account of the fibrous nature of the wrought iron—causing it to "settle" under the face.

The body of the Eagle Anvils is of crystallized iron, and no settling can ever occur; the steel face, therefore, remains perfectly true. Also, it has the great advantage, that being of a more *solid* material, and consequently with less rebound, the piece forged receives the full effect of the hammer, instead of a part of it being wasted by the rebound, as of a wrought iron anvil. An equal amount of work can, therefore, be done on this Anvil with a *hammer one-fifth lighter* than that required when using a wrought iron anvil.

The working surface is in *one piece* of JESSUP'S BEST TOOL CAST STEEL, which, being accurately ground, is hardened and given the proper temper for the heaviest work. The *horn* is covered with and its extremity made *entirely of steel.* The body of the Anvil is of the strongest grade of American iron, to which the cast-steel face is *warranted to be thoroughly welded and not to come off.*

Price List, October 1st, 1876. ANVILS weighing 100 lbs. o 800 lbs., 9c. per lb. Smaller Anvils, ("Minima.")

No.	00	0	1	2	3	4	5	6	7	8	9
Weighing about	5 lb.	10 lb.	15 lb.	20 lb.	30 lb.	40 lb.	50 lb.	60 lb.	70 lb.	80 lb.	90 lb.
	$2·25	$2·75	$3·25	$4·00	$4·50	$5·25	$6·00	$6·30	$7·25	$8·00	$8·50

N. B.—These are the RETAIL PRICES. The only additional cost will be the freight to the purchaser's place of residence.

THESE GOODS ARE SOLD BY THE GENERAL AGENTS (with special discounts to the trades.)

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FISHER & NORRIS, Sole Manufacturers, Trenton, N.J.

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DODGE HAY PRESS.

"DRAW-UP" PRESSES,
For Domestic use, Drugs, &c.

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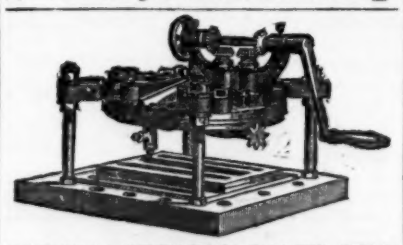
See *The Iron Age* of July 4, 1878.

Axe, Hatchet, Powder and Brush Machinery.

IRON AND BRASS CASTINGS.
Pulleys and Shafting.



PATENT PORTABLE VALVE SEAT ROTARY PLANING MACHINE.
Manufactured by the
L. B. Flanders Machine Works,
1025 Hamilton St., Philadelphia.
Descriptive Circular on application.

Wire-Drawing Machiner

complete, from Rods to No. 40 Wire, is manufactured by

S. HEALD & SON,

Send for prices, &c. **Barre, Mass.**

JOHN STARR,

Hardware & Metal Broker,

AND

MANUFACTURERS' AGENT,

Halifax, Nova Scotia,

Representing in the Dominion of Canada several American Manufacturers, is ready to accept further Agencies. Satisfactory references.

NEW IRON TACKLE BLOCKS.

Norcross Patent.

Galvanized Malleable Iron Shell and Sheave, Steel Hooks, Steel Pins.

Superior to Wood Blocks on account of not Checking and Cracking.

The Strongest, Lightest, Easiest Running and most Durable Block yet produced.

Send for sample and price list of same to

HENRY B. NEWHALL 11 WARREN ST. N NEW YORK AGENT

Providence Tool Co.,

PROVIDENCE, R. I.

Or to **J. H. Work, 13 Pearl St., Boston, Mass.; S. H. & E. Y. Moore, 68 Lake St., Chicago, Ill.; Henry B. Newhall, 11 Warren St., N. Y.**

HUNDLEY & HANKS,

PROPRIETORS OF

NORTH CAROLINA HANDLE CO.

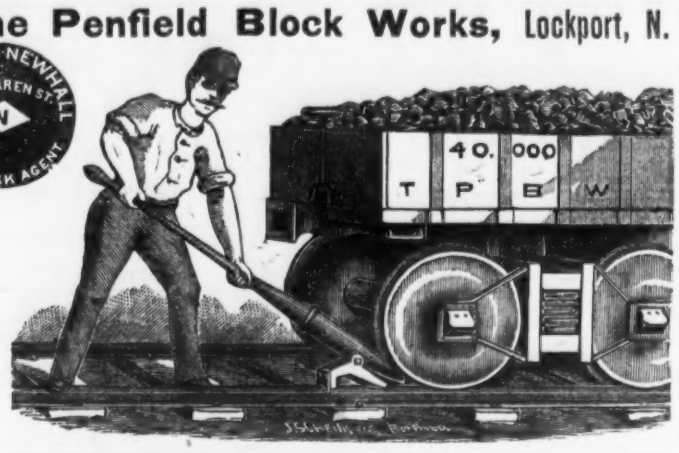
MANUFACTURERS OF

Handles and Spokes,

79 Reade Street and 97 Chambers Street, - - - NEW YORK,

HARDWARE COMMISSION MERCHANTS.

The Penfield Block Works, Lockport, N. Y.



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THE HP HORSE NAIL CO.,

Cleveland, Ohio.

These Nails are manufactured from the **Best Selected Stock.** Send for circulars showing discounts.

These Nails are **Guaranteed to be Equal** to the best in the market, and are sold at greatly reduced rates.

5d	6d	7d	8d	9d	10d
26c.	23c.	21c.	20c.	19c.	18c.

NORTHWESTERN HORSE NAIL CO.

ESTABLISHED IN 1862,

Hammered & Finished Horse Nails.

We offer our Finished Nail to the trade with the confidence that it has no equal in the market. It is the genuine "Northwestern" Nail, Finished, and we give it our unqualified guaranty.

Office and Factory, 56 to 68 Van Buren St., Chicago.

A. W. KINGSLAND, Secretary.

Our agents, Graham & Haines, 213 Chambers Street, New York, carry a full line of our goods, and will be pleased to serve you at Factory prices.

GLOBE NAIL COMPANY,

MANUFACTURERS OF

Pointed Polished & Finished Horse Shoe Nails.

Recommended by over 20,000 Horse Shoers.

All nails made from best NORWAY IRON, and warranted perfect and ready for driving. Orders filled promptly and at lowest rates by

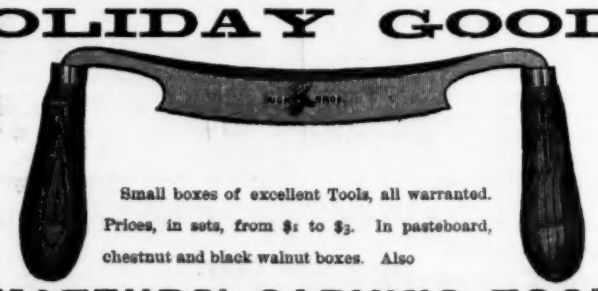
GLOBE NAIL CO., Boston, Mass.

THORNE, DeHAVEN & CO., Drilling Machines,

21st Street, above Market, Philadelphia.

PORTABLE DRILLS. Driven by power in any direction.
RADIAL DRILLS. Self-feed—Large Adjustable Box Table.
VERTICAL DRILLS. Self-feeding.
MULTIPLE DRILLS. 2 to 20 Spindles.
HORIZONTAL BORING AND DRILLING MACHINES.
HAND DRILLS. CAR BOX DRILLS.
SPECIAL DRILLS. For Special Work.

HOLIDAY GOODS.



Small boxes of excellent Tools, all warranted. Prices, in sets, from $1 to $3. In pasteboard, chestnut and black walnut boxes. Also

AMATEURS' CARVING TOOLS.

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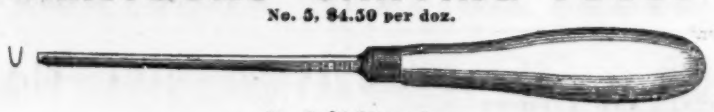

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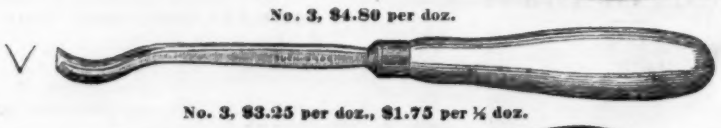

No. 3, $3.25 per doz., $1.75 per ¼ doz.

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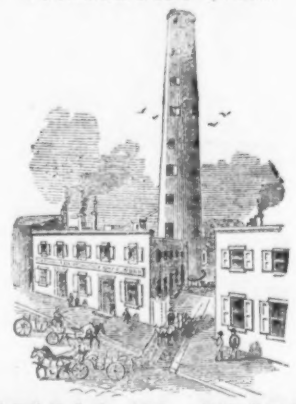
Of the best quality. All handled and ground sharp. Put up in sets of 3, 4, 6, 8, 10 and 12 tools. These tools are all made by hand, and are forged from the best quality cast steel, and every tool is stamped with our name.

BUCK BROTHERS,

RIVERLIN WORKS, • • Millbury, Mass.

The Oldest Shot Tower in America.

FOUNDED JULY 4, 1808.



THOMAS W. SPARKS,

Manufacturer of

SPARKS' American Chilled Shot,

Rivaling the English and all Others.

STANDARD DROP & BUCK SHOT AND BAR LEAD.

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Our SPECIALTIES are admitted to be the best in the world of their kind after 5 years of trial. Send for 18 page book (10 illustrations) with Discount Sheet. List includes Belting, Grain Scoops, Etc.

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Corrugated BELT BOLT. Pat. Pending.

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Manufacturers of

Chilled Sand and Patent Homogeneous Steel

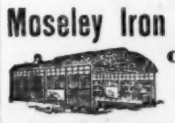
ROLLS,

Both Solid and Hollow,

Ore and Clay Pulverizers, Rotary Squeezers, Haskin's Patent Double Spiral Pinions, and **Rolling Mill Castings of every description.**

OFFICE, 6 Wood St., - - PITTSBURGH.

Moseley Iron Bridge & Roof Co.,



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5 Dey Street, New York.

WESTON DYNAMO-ELECTRIC MACHINE

NICKEL.

The rapid increase in the use of Nickel-Plating owing to the introduction of the Weston Machine and the very low price of nickel material, enables us to give greatly reduced estimates for complete outfits.

We are furnishing outfits specially adapted for Stove Work, giving a pure white deposit on plain or mat surfaces.

Outfits complete, with Dynamo-Electric Machine Tanks, Anodes, Solution, &c., &c., $250.

We beg to refer to the following Stove Manufacturers among 500 other houses using the Weston Machine: Richardson & Boynton, S. S. Jewett & Co., Fuller, Warren & Co., Perry & Co., Detroit Stove Works, Michigan Stove Co., Co-operative Stove Co., E. & C. Gurney, Hamilton & Toronto, and many others.

INFRINGEMENTS.

We call attention to infringements of the Weston Machine, in which Automatic Switches are used to prevent change of current. The Weston Co. are owners by grant or purchase of all forms of Automatic Switches for Plating Machines. The adoption of these machines will certainly lead to great loss to parties purchasing or using them.

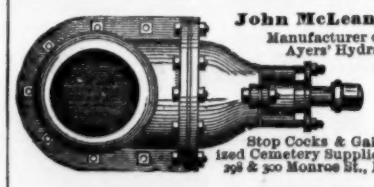
CONDIT, HANSON & VAN WINKLE
Sole Agents NEWARK, N.J. U.S.A.

ENGLISH AGENCY: 18 Caroline Street, Birmingham.

NICKEL PLATING.

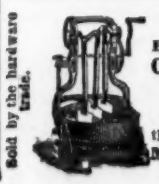
J. HARTMAN,

37½ North 7th Street, PHILA.



John McLean, Manufacturer of Ayers' Hydrants

Stop Cocks & Galvanized Cemetery Supplies 298 & 300 Monroe St., N. Y.



Sold by the hardware trade.

DRAW CUT" BUTCHERS' MACHINES.

Choppers, Hand and Power.

Stuffers,

Lard Presses.

Warranted thoroughly made and the BEST IN USE.

MURRAY IRON WORKS, Burlington, Iowa.

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Reported by Macomber, Bigelow & Dowse, 156 to 164 Oliver St.

Anvils.—"Eagle American" ₩ ℔ 9c. dis 20 %
Apple Parers.—Reading ₩ doz $4.50
Lightning ₩ doz 6.50
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Axes' Tools.
Anvil & Vise.—
No. 1, $4.50; 2, 3.75; 3, 3.00 each dis 25 %
Augurs & Bitts.—Snell's Auger dis 50 %
L'Hommedieu's Ship Augers dis 15 %
Jenning's Bitts dis 10& 10 %
Cook's Bitts dis 50 %
Shepardson's Double-Cut Bitts dis 45 %
" " Gimlets dis 45 %
Stearn's Extension Hollow Augers per doz $30.00
Bonney's " " per doz 33.00
Axes.—Blue Jackets per doz 8.00
Red Cross per doz 7.50
" Handled per doz 9.50
Dowse " Boys' dis 15 %
Ax Handles.—
Oak Extra, 31 in., No. A ₩ doz $2.25
" 34 in., No. A ₩ doz 2.50
" 31 in., No. B ₩ doz 1.75
" 34 in., No. B ₩ doz 2.00
" 31 or 34 in., No. C ₩ doz 1.25
Axle Clips dis 60 %
Balances.—Chatillon's dis 25&10 %
Barn Door Rail.—
Cast Angle (for Anti-Friction Hangers) per ft. 3c
" Half-Round per ft, ⅝, 2½c; ⅞, 4½c
Wrought " per ft, ⅝, 3½c; ⅞, 4c; 1, 5c
Bells.—Connel's Crank Gong dis 40&10 %
Bird Cages,
Japanned M. B. & D., reduced list, 1878 dis 25 %
Brass " 1878 dis 25 %
Blind Fasts.—Lock Fasts ₩ C sets $4.00
No. 6 Fasts ₩ C sets 4.00
Veazie Fasts ₩ C sets 7.00
Shedd's ₩ C sets 8.00
Blind Hinges.—Mail. Hook, 3 holes ₩ C sets 5.00
Brad Awl Handles.—
Phœnix Adjustable ₩ doz $2.00
Bolts.—Norway Iron Carriage dis 70&10 %
Common " dis 75&10 %
Borax.—Refined ₩ ℔ 9c
Boring Machines.—Snell Upright each, $3.25
Snell Angle each, 4.00
" Augers ₩ set 1.75
Braces.—Barber's dis 40& 5 %
Spofford's dis 50 %
Backus' dis 60 %
Bracket Saws.
Bracket Saws, extra quality, to No. 5 ₩ gro $0.85
Steel Frame, with patterns ₩ doz 7.50
Bracket Saws.—Roger's each $2.25
Lester dis 25 %
Brackets.
H. B. & M. Flower Pot dis 50&10 %
Bronzed Shelf, M. B. & D. list dis 10&10 %
Bread Kneader.—Stanyan dis 25 %
No. 4 capacity 3 loaves ₩ doz $24.00
No. 5 " 5 " ₩ doz 27.00
No. 6 " 8 " ₩ doz 33.00
Bronze Hardware.—Norwalk Lock Co. dis 50&10 %
Butts.—Union Fast Joint dis 50& 10 %
" Loose " dis 75&5 %
" Japanned Acorn dis 75&5 %
" Silvered " dis 74&5 %
" Boston Filish dis 75&10 %
Centennial Spring dis 25 %
Carriage Jacks.—Climax ₩ doz $15.00
" large size ₩ doz 18.00
Cartridges.—U. S. Cartridge Co. dis 60 %
Cards.—Sargent Horse and Curry dis 33⅓&10 %
Cotton dis 25&10 %
" Wool dis 25&10 %
Casters.—Bed and Table dis 50&10 %
Chain.—Traces 6½, 10, 4, straight ₩ pair 45c
" 6½, 10, 4, twisted ₩ pair 50c
" 7, 12, 2, " ₩ pair 75c
Coil 3-16 ₩ ℔ 10c
" ¼ ₩ ℔ 8c
" 5-16 ₩ ℔ 7c
" ⅜ ₩ ℔ 6c
" 7-16 ₩ ℔ 5½c
" ½ ₩ ℔ 5½c
Chalk.—White, Carpenter's ₩ gross 14c
Red, Carpenter's ₩ gross 75c
Blue, ₩ gross 90c
Chisels.—Hart, Bliven & Mead, Framing dis 70 %
Underhill, Framing dis 25 %
Buck's Shank, Framing dis 25 %
Clothes Line,—
Galvanized Wire, 100 feet each ₩ doz $4.50
Coal Hods.—Ironclad.—Galvanized dis 25 %
Japanned dis 30 %
Copper Rivets dis 25 %
Cocks.—Brass, L. F. & C. dis 50 %
Cordage.—Manila, usual trade dis ₩ ℔ 12c
Jute ₩ ℔ 9c
Cow Ties. dis 45 %
No. 30, 3 ft. No. 6 Wire, with toggle ₩ doz $2.00
No. 35, 3 ft. " " with snap ₩ doz 3.80
No. 40, 3½ ft. " " with toggle ₩ doz 3.90
No. 45, 3½ ft. " " with snap ₩ doz 4.10
No. 50, 4 ft. No. 4 " with toggle ₩ doz 4.50
No. 55, 4 ft. " " with snap ₩ doz 4.75
No. 60, 4½ ft. " 3 " with toggle ₩ doz 5.38
No. 65, 4½ ft. " " with snap ₩ doz 5.62
Crows-bars. Cast Steel ₩ ℔ 5c
Iron, Steel Pointed ₩ ℔ 5c
Cutlery.—Pocket, American Shear Co.'s dis 33⅓&10
Butcher Knives, "Woods," Lap Bolster, Square Handle dis 33⅓ %
Steak Knives dis 20 %
Lap Bolster, Oval Handle dis 25 %
Sticking dis 33⅓ %
Skinning dis 33⅓ %
Butcher, Common Round Handle, "Woods" dis 25 %
Shoe Knives, "Woods" dis 10 %
Dividers.—Cook's. dis 25 %
Dog Collars dis 20 %
Dog Muzzles.—Automatic dis 15 %
Door Springs.—Torrey's Rod ₩ doz $7.00
Gem Coil dis 10 %
Eccentric Steel Coil Spring, No. 1 ₩ doz $2.75
Door Stops.—"Thurston's" dis 50 %
Drawer Knobs.—"Thurston's" dis 50 %
Drills.—Morse Bitt Stock dis 25 %
Morse Straight Shank dis 20 %
Emery.—Wellington Mills ₩ ℔ 10c
Alden's ₩ ℔ 6c
Enamelled Ware.
Standard Mfg. Co. Kettles dis 60 %
" Sauce Pans dis 35 %
Fellow Plates.—Wrought ₩ ℔ 8c
Files.—Madden & Cockayne dis 30 %
American File Co dis 40 %
Nicholson " dis 35 %
Fluting Machines.
Knox, with 6 inch rolls ₩ doz $36.00
Geneva ₩ doz 13.50
Rochester ₩ doz 12.00
Forks.
W. C. & Co., Manure, reduced list dis 15&10 %
Gimlet Bitts.
Genuine German, No. 12S, 1-32 to 8-32, $1.00; 10-32, $1.10; 12-32, $1.20 ₩ doz gold.
Glass Cutters.
Combination Class Cutter and Knife Sharpener ₩ doz $1.25
Grub Hoes.—K. P. & Co.'s No. 2 ₩ doz 7.50
Hammers.—Maydole's dis 15 %
Hammond's dis 20 %
Dowse's Steel, A. E ₩ doz $4.00
M. B. & D. dis 25 %
Hangers & Rollers.—Anti-Friction dis 60 %
Climax dis 50 %
Novelty dis 40 %
Common dis 50 %
Hand Screws dis 20 %
Hatchets.—Dis. 15 %
C. F. Dowse, Combination per doz. $10.00
Underhill dis 25 %
Hay Knives.—Lightning ₩ doz $18.00
Hinges.—Strap and T (new list) dis 60&10 %
Providence Plate ₩ ℔ 40
Wrought Screw Hook ₩ ℔ 40
Hoes.—W. C. & Co.'s (reduced list) dis 15&10 %
Hooks and Staples.—Brewers' dis 50 %
Horse Nails. No. 6 7 8 9
National Finished .23 .21 .20 .19 dis 15 %
Putnam Pointed .23 .21 .20 .19 net
Horse Nails.—Bridgewater dis 25 %
No. 6, 23; No. 7, 21; No. 8, 20; No. 9, 19.
Knobs.—"Norwalk."
Mineral ₩ doz $0.75
Porcelain, Japanned Mtg ₩ doz .85
" Por. Rose Nickel Mtg ₩ doz 2.60
" Plated " " ₩ doz 2.50
Silver Glass ₩ doz 8.00
" Bell Pulls ₩ doz 6.00
Lanterns.—Tubulars, No. 0 ₩ doz 10.00
Railroad, Oil, No. 43 ₩ doz 8.00
Guarded, Oil and Candle, No. 25 ₩ doz 3.50
Triangular ₩ doz 4.00
Hurricane dis 20 %
Lead.—Sheet ₩ ℔ 6½c
Pipe ₩ ℔ 7½c
Locks.—Norwalk Lock Co. (reduced list) dis 50&10 %
Eagle Cabinet dis 25 %
" Trunk dis 25 %
W. Wilcox & Co., Padlocks dis 33⅓&5 %
American Lock Co.'s Steel Key dis 33⅓ %
Metallic Sleeves.—Mann's Patent dis 33⅓ %
Manure Forks.—W. C. & Co. (r'duc'd list) dis 15&10 %
Mattocks.—K. P. & Co., Long Cutter ₩ doz $9.50
K. P. & Co., Short Cutter ₩ doz 9.00
" Pick ₩ doz 9.00
Measuring Tapes.—Eddy's dis 20 %
Meat Cutters.—Miles' Challenge dis 30 %
Hale's dis 50 %
American dis 25 %
Money Drawers.—Tucker's Alarm ₩ doz $27.00
Mouse Traps.—Delusion ₩ doz 2.00
Oilers.—Zinc and Tin dis 50 %
Brass and Copper dis 50 %
Ox Bows.—Extra finished and varnished dis 10 %
1⅛ in., ₩ doz. pair $5.75 | 2 in., ₩ doz. pair $9.00
1¾ in., " " " 8.00 | 2½ " " " 11.00
Padlocks.—W. Wilcox & Co.'s dis 33⅓&5 %
Miller's Brass ₩ doz $9.00
Picks.—K. P. & Co., Adze Eye, 5 to 6 ℔ ₩ doz 6.50
" 6 to 7 ℔ ₩ doz 7.00
Planes.—Auburn Tool Co dis 35 %
N. Y. Tool Co. dis 50 %
English Iron dis 50 %
Bailey's dis 25&10 %
Plated Ware.—Rogers & Bro. dis 40&5
Pliers.—Vom Cleff & Co.'s Gold list
Button's Wire Pliers dis 33⅓ %
Plumb & Levels.—Stanley, R. & L. Co. dis 60&10
Pocket Knives.
American Shear Co.'s dis 33⅓&10
Potato Diggers.
W. C. & Co. reduced list dis 15&10
Pulley Blocks dis 33⅓
Pumps.—Union Manufacturing Co.
Iron Cistern dis 45 %
" Pitcher Spout dis 55 %
Copper dis 25 %
Rivets.—Black dis
Carriage in 10 ℔ papers dis 40
Copper dis 25
Razor Strops.—Torrey's Full line.
Rules.—Stanley Boxwood, dis 60&10 %
" Ivory, dis 50&10 %
Sadirons.—Common ₩ ℔ 3½c
Laundry ₩ ℔ 5c
Tailor's Geese ₩ ℔ 5c
Enterprise, "Potts" dis 33⅓ %
Mrs. Potts' Large Polishing, Nickeled ₩ doz net $6.50
Sash Locks.—King & Hutchinson's, new list dis 40 %
Hopkins & Dickinson's dis 40 %
Sandpaper.—Baeder & Adamson dis 15 %
M. B. & D. dis 20 %
Sash Weights.—Patent Eye ₩ ℔ 1¾c
Saws.—Hand Saws, Disston's dis 20 %
Wheeler & Clemson dis 20&5 %
Cross-Cut Saws.
W. M. & C., Common Tooth, No. 1 ₩ foot 35c
" Champion " ₩ foot 35c
Disston's, Common " ₩ foot 44c
" Gt. American " ₩ foot 44c
Boynton's Lightning " ₩ foot 45c
Saw Setts.—Spring Lever ₩ doz $10.00
Saw Blades.—Disston dis 20 %
W. M. & C. dis 20&5 %
Welch & Griffith, Extra ₩ doz $9.60
" " No. 2 ₩ doz 8.00
Scales.—Fairbanks dis 25 %
Howe dis 25 %
Screws.—Aiken's Flat-Head Iron dis 65 %
American Flat-Head Iron dis 65 %
" " Brass dis 50 %
" Round-Head " dis 35 %
" " Iron dis 50 %
Grilley " Nickel-plated Piano dis 55&5 %
" " Common dis 50
Shaves.—Kimball's ₩ inch 7½
Watrous dis 15 %
Shears.—American Shear Co dis 75 %
Shot.—Tatham's ₩ ℔ 6c
Shovels.—O. Ames dis 33⅓ %
O. Ames, other brands dis 37½ %
M. & D. dis 37½ %
Oxford, Birmingham Pattern dis 41 %
Snow Shovels.—Malleable tips ₩ doz $4.00
Skates.—Union dis 25 %
Acme dis 20 %
Spoons.—Tinned Iron dis 15 %
Britannia dis 50 %
Rogers' A No. 1 dis 40&5 %
Stock and Dies.—King's dis 10&5 %
Tacks.—A. Field & Son's dis 50&10 %
Pittsfield dis 50&10 %
Traps.—Oneida, Genuine dis 33⅓ %
Oneida, Imitation, H. & N dis 50&10 %
Blake's dis 50&10 %
Tree Scrapers.—No. 1 ₩ doz. $2.0
No. 2 ₩ doz 3.0
No. 3 ₩ doz 4.0
Vises.—Solid Box, Blacksmith's ₩ ℔ 10½c
Simpson's Adjustable dis 20&5 %
Howard Vise Co dis 33⅓ %
P. L. & Co., Solid Blacksmiths', new list dis 10 %
Weather Strips.
Browne's Flexible Rubber dis 30 %
In 20 feet boxes; No. 1, ¾ in. wide, ₩ yard, 10c.; No. 2, ⅝ in., 15c.; No. 3, ½ in., 20c.; No. 4, 1 in., 30c.
Valentine's Felt Moulding dis 30 %
Black Walnut Spring Weather Strips ₩ doz. $3.00
Window Awning.
Dearborns' per window; $1.00, dis 35 %
Window Springs. dis 10 %
Babcock's No. 3 ₩ gross $5.25
" 4 ₩ gross 4.50
Wire Goods.—Gate Hooks and Eyes, &c. dis 70&10 %
Wrenches.—A. G. Coe's dis 60 %
Girard Mfg. Co. dis 50&10&10 %
Girard, in case lots dis 50&10, 10&10 %
Wringers.—Universal, No. 2 ₩ doz $6.50
Universal, No. 2½ ₩ doz 6.00
Novelty, No. 10 ₩ doz 6.00
" No. 2 ₩ doz 6.00
" No. 22 ₩ doz 07.00
Excelsior, No. A ₩ doz 7.00
" No. B. ₩ doz 8.00
" No. CC. ₩ doz 10.00
Novelty Set Tub, E ₩ doz 6.00
Eureka ₩ doz 5.00
Zinc ₩ ℔ 6c
Withington, Cooley & Co.—Hoes, Rakes, Forks, &c. dis 40 %. Special rate for Export.

St. Louis Metal Market.

(Corrected Weekly by Messrs. R. Sellers & Co.)

Tin Plate.

IC, 10x14, Best Char.	$ 6 50	DX, 12½x17, B. Char.	$ 8 5
IX, 10x14, " "	8 50	DXX, 12½x17 " "	10 50
IC, 12x12, " "	6 50	DXXX, 14½x17 " "	14 50
IX, 12x12, " "	8 50	IC, 20x28, " "	16 00
IC, 14x20, " "	6 50	IX, 20x28, " "	20 00
IX, 14x20, " "	8 50	IXX, 20x28, " "	25 00
IXX, 14x20, " "	10 50	IC, 14x20, Best Roof	6 00
IXXX, 14x20, B. Char.	12 50	IX, 14x20, "	8 00
IXXXX, 14x20, " "	14 50	IC, 20x28, "	12 50
IC, 12x24, " "	6 75	IX, 20x28, "	16 00
IC, 14x14 " "	13 50	IC, 10x14, Best Coke	5 75
IX, 14x14, " "	16 00	IC 14x20, "	5 75
IXX, 14x14, " "	18 50	IC, 10x20, "	9 00
DC, 12½x17, " "	6 50		

Sheet Iron.	Comm'n.	S L U Sm'th.	D. Ref'd Sm'th.	Juniata Sm'th
No. 16 to 20	3½c	5 6c	5 6c	6 8c
No. 22 to 24	3 0c	3 8c	5 8c	7 0c
No. 26	3 10c	3 9c	6 c	7 2c
No. 27	3 20c	4 c	6 2c	7 4c

Genuine Russia Iron.

Perfect—No. 9, 10, 11, 12 per lb. 12½c
No. 1 Stained—No. 9, 10, 11, 12 Per lb. 12½c
Tare 22 lbs. to Bdle. 2 or less than Bdle. add 1c. ₩ lb.

Patent Planished Iron

No. 24 to 27, A quality per lb. 10½c
" B " 9½c
For less than Bdle. add 1c. per lb.

Galvanized Sheet Iron.

Juniata, or 1st quality, Discount for full bundles 45 %

Block Tin.

Banca, Large Pigs	21c	do. Small	18
Straits, Large Pigs	17c	Bar	19c
Eng. Ref'd, Large Pig	17c		

Solder.

Extra in Bars	12c	No. 2, in Bars	9½c
No. 1, in "	10c	Spelter Solder	14c
Pig Lead —Pigs	4c	In Bars	5c
Antimony			14c
Bismuth			$1 50
Nickel			2 00
Crucibles.—Dixon's			₩ No. 4½c

Babbit Metal.

No. 1	₩ ℔. 16c	No. 3	₩ ℔ 11 c
" 2	" 14c	" 4	" 7½c

Copper.

Brazier's, 30x60, 14 to 100 lbs. Sheets			16c
" " " 10, 11 & 12 lbs.,		" "	28c
" " 8 and 9 lbs.		" "	30c
" " 6 and 7 lbs.		"	32c
Tinned, 14x48, 14 and 16 oz.			24c
Planished, 14x48, 14 and 16 oz.			28c
" Boiler Sizes. 14 and 16 oz.			35c
Gutter Copper, 20 and 24x72, 10, 11 and 12 ℔. Sheets			29c
" 14 ℔. Sheets			26c
Reservoir Copper, 16x60 and 18x60			28c
Bar Copper, Square and Round, ⅜ to 1⅛ inch			26c
" " ⅝ inch			19c
Copper Bottoms			32 c
Soldering Coppers			26c

Brass.

Roll, No. 10 to 28, 12 in. in width	25c
" 30, 12 in. in width	26c
" 32, 16 "	28c
" 34, 16	30c
" 36, 16	34c
Plates, No. 40, 6	4

Brass and Copper Wire.

	Brass.	Copper.		Brass.	Copper.
No. 0 to 20	28c	31c	No. 24	52c	41c
" 21	31c	41c	" 25	38c	45c
" 22	32c	40c	" 26	40c	50c
" 23	33c	43c	" 27	49c	52c

Brass Spring Wire, 2c. ₩ ℔ advance.

Brass Tubing.

Plain ¼ to 3 inch	38c	5-16 inch	38c
⅜ inch	38c	½ "	60c

Copper Rivets and Burs dis 25 %
Brass Kettles 8 to 13 inches ₩ ℔ 35c.
" " all sizes over 13 inches " 40c.
Sheet Zinc.—600 lbs. cask " 5½c
250 lbs. cask " 6c
Sheet " 6½ c
Wire.—Iron, Bright Market dis 50
Iron, Coppered Market dis 45
Fence, Nos. 7, 8 and 9 ₩ ℔ 4
Trellis, Nos. 10 and 11 " 4½c
" No. 14 " 5 c
Hay Baling, Charcoal, No. 10 and 11 " 5 c
" " No. 12 " 5
Broom, Tinned, Nos. 18 to 22 " 5½c
Fence Staples per Keg 5½c
Per lb. 6
Iron Rivets.—Black, papered dis 25 %
Tinned, papered dis 25 %
In bulk, new 3-16 ¼ 5-16 ⅜ in. diam.
78c 72c 68c 68c per lb.
Tacks.—New Hardware List dis 30
Sad Irons dis 30
Enameled Kettles.—Standard Mfg. Co. 33c
Enameled Sauce Pans.
Standard Mfg. Co. dis 40
Enameled Boilers.—Standard Mfg. Co. dis 40
Dripping Pans.—Smooth Iron ₩ ℔ 65c
Geneva Fluters per doz $1.25
Monroe Fluters " 12½
Stove Polish.—Dixon's per gross 6.75
Gem " 6 gross 6.75
Japanese
Dixon's, in bulk
Coffee Mills.—Parker's ₩ ℔
Granite Iron Ware dis 40 %
Spoons.—New list dis 10
Retinned Iron Ware dis 50 & 10 %
Plain Stamped Ware dis 60 & 10 %
Japanned Ware.—St. Louis List dis 40 & 10 %
Fry Pans dis 40 %
Bars dis 40 %

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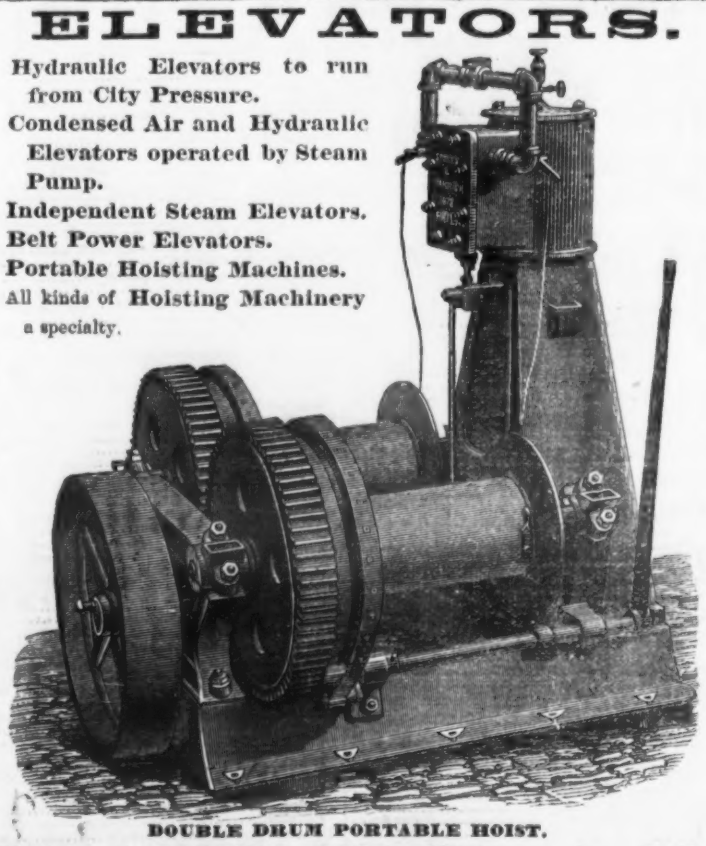
PASSENGER ELEVATORS. FREIGHT ELEVATORS.

Hydraulic Elevators to run from City Pressure.
Condensed Air and Hydraulic Elevators operated by Steam Pump.
Independent Steam Elevators.
Belt Power Elevators.
Portable Hoisting Machines.
All kinds of Hoisting Machinery a specialty.



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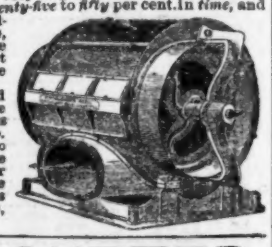
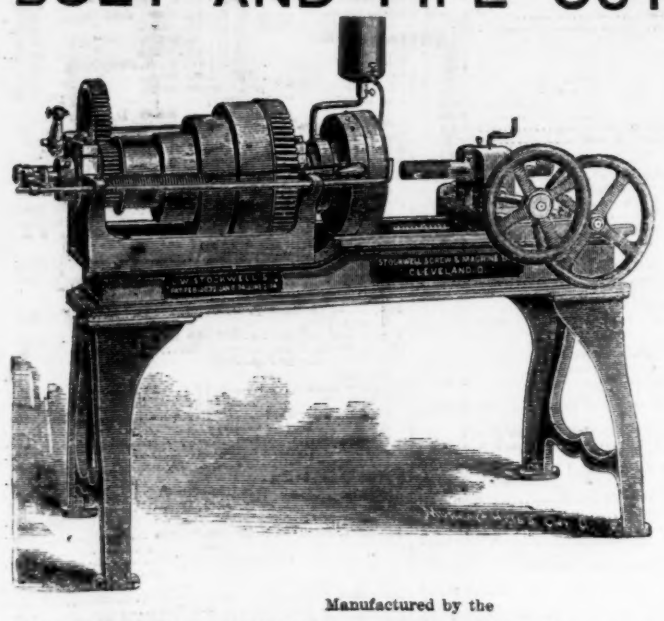
This Cupola has made a great revolution in melting Iron. It differs from all others in having a CONTINUOUS TUYERE, or in other words, the blast enters the fuel at all points. Above one ton capacity per hour, they are made *oval in form*. This brings the blast to the center of the furnace with the *least resistance* and *smallest* possible amount of power, and in combination with the continuous Tuyere causes complete diffusion of the air throughout the furnace, and uniform temperature, melting *ten* or *fifteen tons* an hour with the pressure of blast required to melt *two* or *three tons* in an ordinary Cupola. It also enables us to save very largely in *time* and *fuel*, the experience of our customers showing a gain of *twenty-five* to *fifty* per cent. in *time*, and *twenty-five to forty* per cent *fuel* over the ordinary Cupola, and a BETTER QUALITY OF CASTING, especially in light work. This is due to the thorough diffusion of the air and more perfect combustion, extracting less carbon from the iron, making a softer and tougher casting.

We manufacture these Cupolas of any desired capacity, numbered from 1 to 20, inclusive, the numbers indicating the melting capacities in TONS PER HOUR—No. 1, one ton; No. 2, two tons; No. 3, three tons per hour, and so on up to 15 or 20 tons. We have *improved* the *construction* of these Cupolas in every way, have increased their strength and durability, and sought to make them as convenient for working and repairs as our own, and the experience of our customers, could suggest



BOLT AND PIPE CUTTER.



With our Patent Nut Tapping Device nuts can be tapped very rapidly.

No. 1 cuts ¼ to 1 inch.
No. 2 " ⅜ to 1½ "
No. 3 " ⅜ to 2 "
No. 4 " ½ to 3 "

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A New, Cheap and Simple Boiler Feeder.

This differs from any Pump of its class by doing away with a sliding box or strap, and supplying the places of the same by a hardened steel roller and steel pin. By this construction a great amount of friction is avoided. It is durable, handy and cheap. Anyone of ordinary intelligence can successfully operate it. Prices range from $45 upwards.

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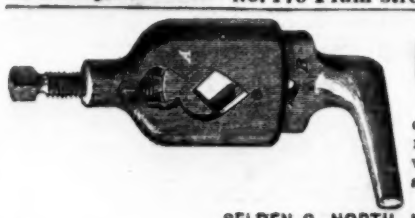

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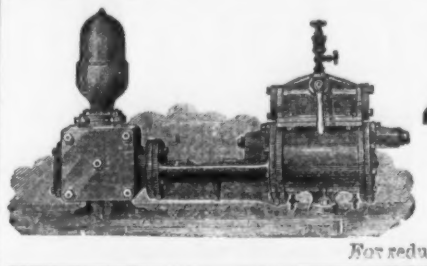

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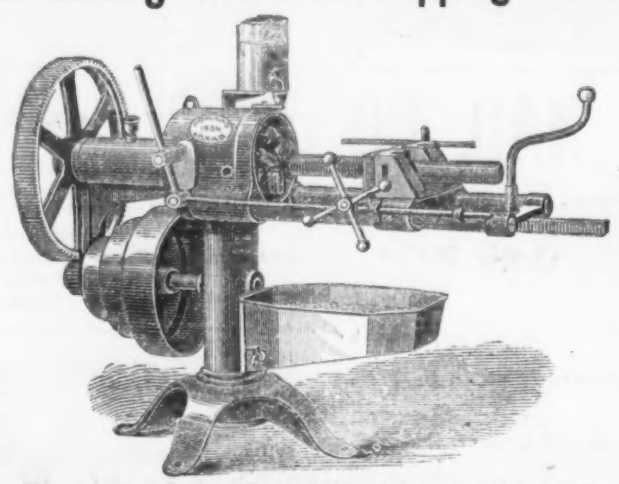
Screw Cutting and Nut Tapping Machines.

No 5 cuts from ¼ to ⅝ inches, price $390
No. 5½ " " " 390
No. 6 " " " 770
No. 8 " " " 760
No. 4 (Double Header) cuts from ¼ to ⅜ inch, price, 950



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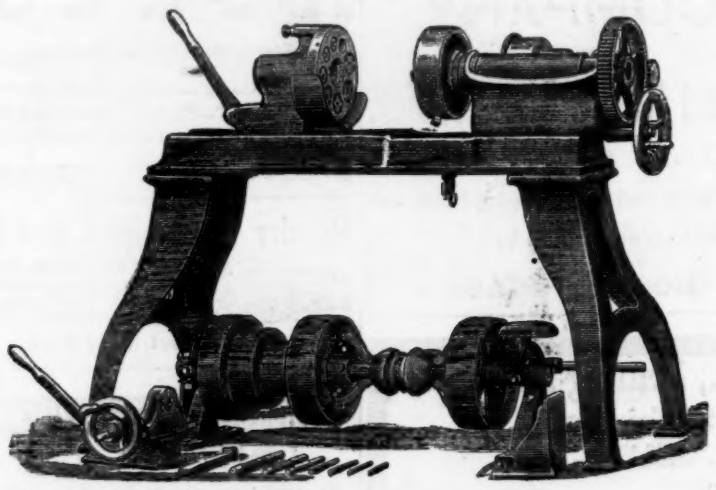
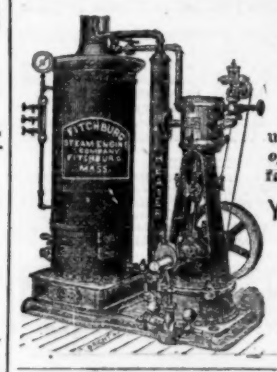


No. 4 Bolt Cutter, Nut Tapper and Drilling Machine combined, with Friction Clutch Countershaft.



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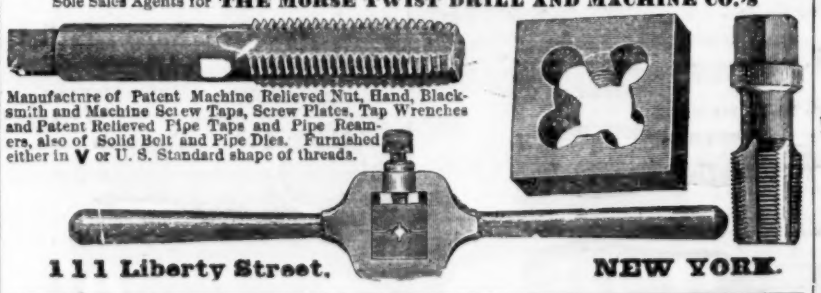

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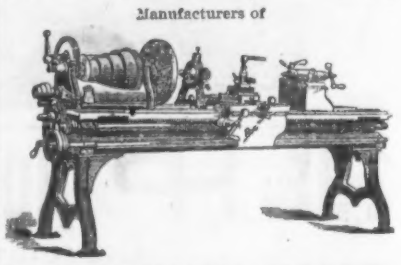

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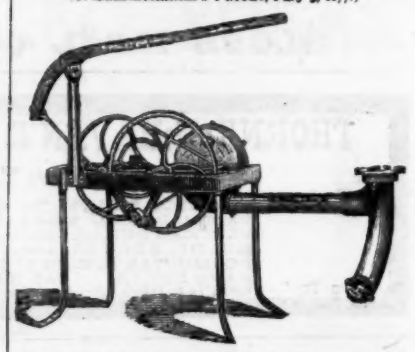

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2¾	40.00	46.00	3.75	12.00
3	45.00	52.00	4.25	14.00
3½	54.00	62.00	4.50	17.00
4	64.00	73.00	5.00	21.00
4½	74.00	84.00	5.50	25.00
5	84.00	95.00	6.00	31.00
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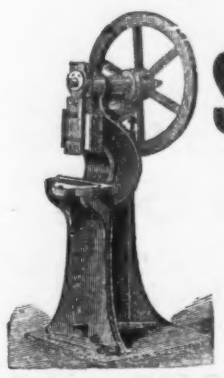

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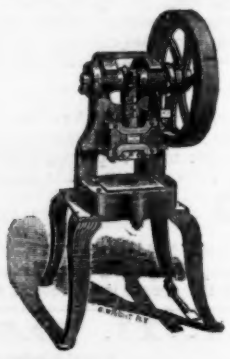

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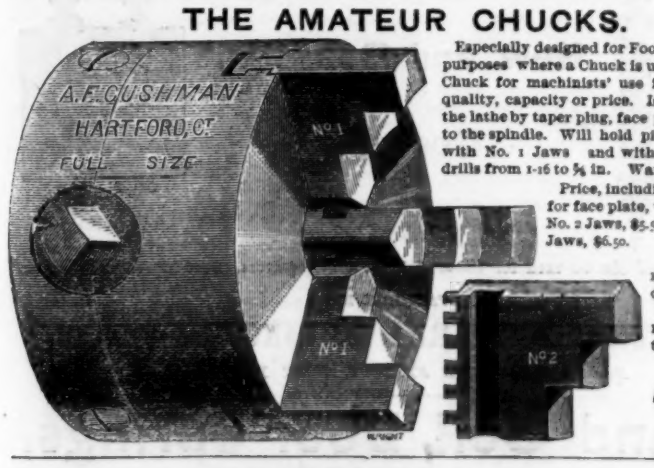

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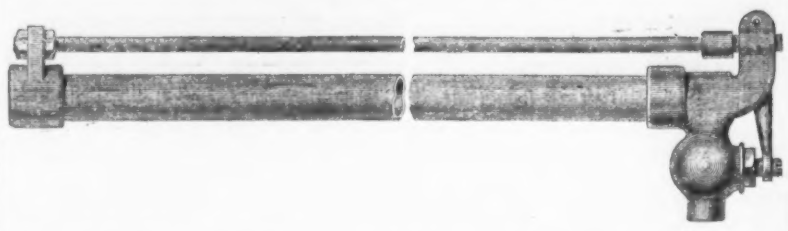

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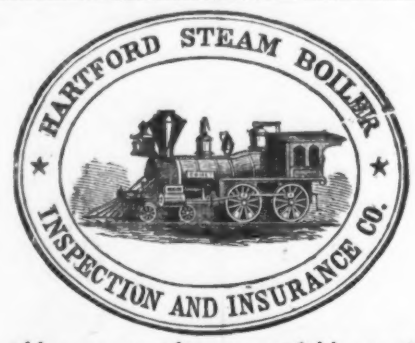

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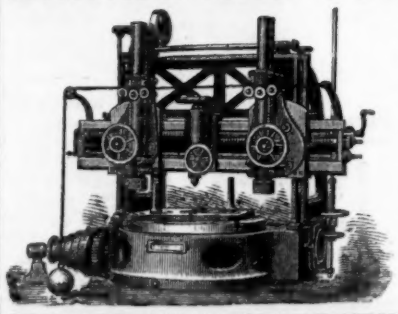

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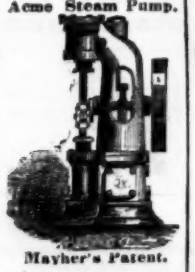

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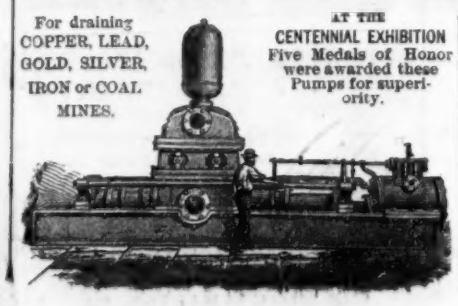

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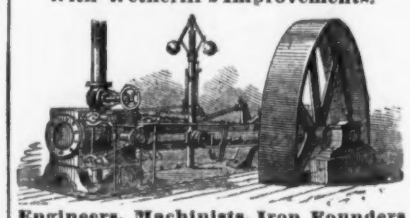

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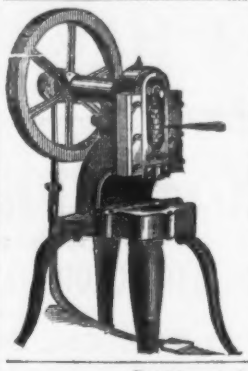

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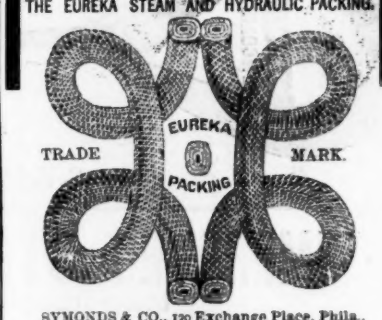

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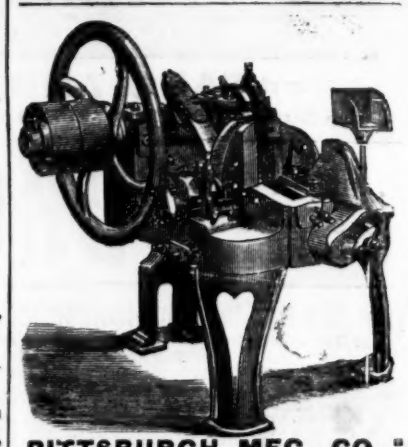

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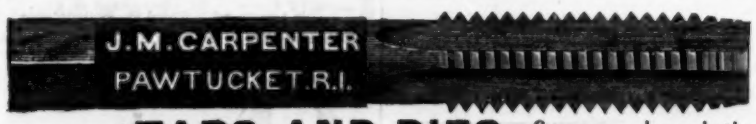

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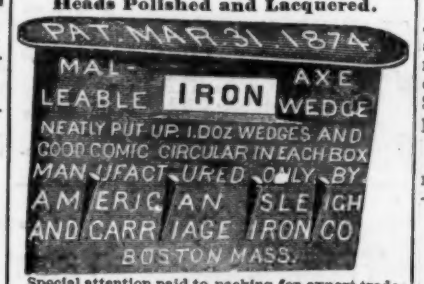

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"BOYNTON'S SAWS were effectually tested before the judges at the Philadelphia Fair, July 6th and 7th. An ash log, eleven inches in diameter, was sawed off, with a four-and-a-half-foot lightning cross-cut, by two men, in precisely six seconds as timed by the chairman of the Centennial Judges of Class Fifteen. The speed is unprecedented, and would cut a cord of wood in four minutes. The representatives of Russia, Austria, France, Italy, Spain, Belgium, Sweden, England, and several other countries, were present, and expressed their high appreciation."

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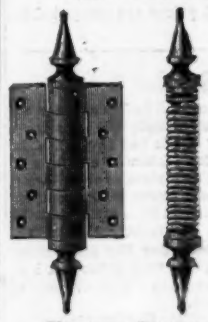

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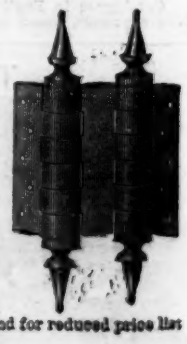

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